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Business Association Leadership

Its Opportunity and Responsibility

ANNUAL CONVENTIONS of trade associations are very significant events in the lives of such organizations. The promotion of personal contacts, of lasting friendships, of good fellowship generally, were perhaps their first and most elemental functions. They are still, and ever will be, important ones. For producers who are seriously and curiously minded, conventions are educational treats. For those whose confidence in themselves, in their companies, in their industry, may be weakening, they are full of inspiration, because they bring contacts with men whose confidence and optimism are infectious.

But more than these, the annual conventions of an industry are the times it makes an appraisal of its worth, of its state of health, of its future prospects. Those who make the appraisal are its members, primarily, although to some extent all other industry is in a degree represented and interested. While seldom given expression, there is much mental note taking; and the thing appraised is leadership.

Trade association governments, or managements, are not democracies, although in deference to our political institutions they preserve the form of democracies. As everyone knows, they are out and out oligarchies, aristocracies if you will, but in general aristocracies of intelligence, character, capacity and willingness-to-serve. Under normal conditions they are self-perpetuating, like other oligarchies. Only conspicuous arrogance or incapacity can bring about their overthrow, or downfall—and therein lies their weakness.

Of course, all men of business experience appreciate that without this kind of organization and association government there would be small chance of any continuity of effort or of any lasting success. This is true of any business organization. There may be several hundred thousand stockholders of the United States Steel Corp., but if its president and management were actually elected annually by the popular vote of these stockholders, obviously the business of the corporation would soon be ruined.

The success of an oligarchical form of government or management depends almost wholly on the leadership. In a big business organization this rests with a few large influential stockholders, or directors, who desire primarily to assure the safety of their own investments. If they are honest and sincere in this purpose, they render the numerous small, inarticulate stockholders a genuine service, which few have the desire or capacity to perform for themselves.

The members of a trade association are its stockholders, literally, for if they are members continuously over a period of years, the sum total of their annual dues constitutes a considerable investment in the association, notwithstanding the fact that this money has long been spent on the current activities of the association. If those dues were wisely expended, they have been at least partially converted into a capital stock of goodwill, prestige and capacity to serve. It is the duty of the directors, who presumably are the largest or ablest "stockholders," to seek the security of their investment in the association; and in doing so they render genuine service to every member.

In the background or history of every successful organization we always find one outstanding personality, or maybe more than one, who has given character to the leadership of that organization—one who has imbued by example his associates and successors with ideals and a desire to serve. Sorry indeed is the organization which has lacked at least one such personality. The leaders who follow immediately can hardly be other than able men, men of large calibre who are not disconcerted by the prospect of possible comparisons with an able leader, but who desire chiefly to retain the honor and prestige of the office that such outstanding men give it. To become the president of the organization means no mere honor, but a great responsibility, rightfully sought and justly accepted in utmost earnestness.

The perpetuation of this kind of leadership is obviously exceedingly difficult, but not impossible. Those members who do not fully understand this and who lack sympathy rather than envy for those chosen, should realize that the duties and burdens of office usually overweigh the honors, and that only a genuine desire to be of service to his fellow man ever tempts an able leader to accept. There never was a time when inspired leadership was more essential to industry. Consequently the opportunities of leadership are boundless. The only reward of leadership is understanding, sympathy and co-operation. It is also the kind of environment which breeds great leaders.

National Sand and Gravel Association Emphasizes Operating Costs

St. Louis Convention, January 27 to 29, Re-elects Officers with Few Changes

TO ATTEMPT to summarize in a few words the high points of the 15th annual convention of the National Sand and Gravel Association at St. Louis, Mo., January 27 to 29 inclusive, is very difficult, because the convention program was crowded with interesting and valuable papers; but perhaps the most outstanding of any of the sessions in general and practical interest was that devoted to operating problems, under the chairmanship of F. A. Bingham, of the Northern Gravel Co., West Bend, Wis., which contained three papers replete with methods and costs of plants operating under three more or less typical conditions.

Throughout the rest of the program there was much of interest on sales, management, operation, research and association affairs, and we will treat the papers and discussion in somewhat the order outlined.

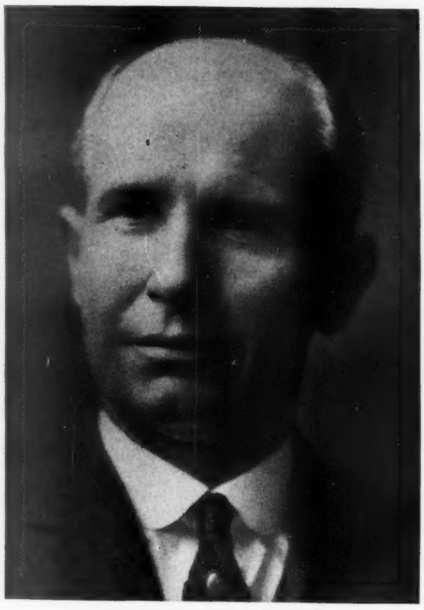
We will pass over the usual features of all conventions and start with one of the most interesting papers on the program, the report of the census of the sand and gravel industry by **F. E. Berquist**, Bureau of the Census, United States Department of Commerce, for it was the first governmental attempt to really analyze the sand and gravel industry.

Size and Scope of the Sand and Gravel Industry

The summary we give herewith is only a part of the material given by Mr. Berquist in his talk, but the rest of it will be released for publication in the course of a few weeks. It specifically divides the sand and gravel industry into the various types of operations. Roughly these are: approximately 25% shovel operations, 25% dragline (including, apparently, cableway excavators), 25% pump dredges and 25% dredges of other types and combinations of two or more of the preceding types of operations. There are about 300 plants in each of these classifications, making approximately 1200 plants in all, or to be exact, 1152. A general summary of Mr. Berquist's paper follows:

"The Bureau of Census announces that, according to data collected in the Census of Mines and Quarries taken in 1930, production of sand and gravel in the United States in 1929 by establishments falling within the scope of the canvass amounted to 165,526,074 tons, valued at $100,016,527. These figures do not include approximately 10,000,000 tons of sand and gravel for which incomplete reports, or no reports, have been received to date.

"This industry, as defined for census purposes, embraces those establishments engaged wholly or principally in the commercial production of washed or screened sand and gravel. Data for railroad, state, county and municipal operations are not included in these figures, those operations being considered as noncommercial. Data for establishments with annual commercial production of less than 25,000 tons are not included. Glass sand, molding sand and ground sand obtained from quarried sandstone will be reported separately in connection with special sands and silica.



Robert J. Potts, president

"The number of establishments falling within the scope of this canvass for which reports have been received was 1152. The aggregate number of persons employed was 19,628, of whom 15,662 were reported as wage earners (average for the year). A total of 3713 salaried employes represented 986 officers of corporations (933 male and 53 female) and 2727 managers, superintendents and clerks (2248 male and 479 female).

"Principal expenses amounted to $53,709,767, of which $33,470,169 represented expenditures for salaries, wages and contract work, and $20,239,598, the cost of supplies, fuel and purchased electric current. Of the amount expended for salaries, wages and contract work, $4,938,827 was reported for salaried officers, $6,048,516 for managers, superintendents and clerks and $22,129,921 for wage earners. Contract work amounted to $352,905.

More Than $20,000,000 for Supplies, Fuel and Power

"Of the total expended for supplies, fuel and purchased electric current ($20,239,598), $11,666,227 was reported for supplies, $3,772,514 for fuel and $4,800,857 for purchased electric current. The cost of equipment purchased during 1929 was reported as $6,757,694. The aggregate rating of power equipment was 517,804 horsepower. The fuel reported included 652,427 tons of coal, 5901 tons of coke, 16,336,988 gal. of fuel oil and 5,488,914 gal. of gasoline and kerosene.

"With the exception of Delaware, all states and the District of Columbia contributed to the total production of approximately 166,000,000 tons of sand and gravel. New York, the leading state, reported 17,000,000 tons; California and Michigan, 15,000,000 tons each; Illinois and Ohio, 13,000,000 tons each, and Pennsylvania 10,000,000 tons. These six states accounted for one-half of the total quantity reported.

"The statistics for 1929 are given in the following table. These figures are preliminary and subject to revision.

PRINCIPAL STATISTICS FOR THE INDUSTRY: 1929

Number of enterprises (establishments—plants—not companies)	1,152
Persons engaged, total	19,628
Proprietors and firm members	253
Salaried employes, total	3,713
Male	3,181
Female	532
Wage earners (average for the year)	15,662
Principal expenses, total	$53,709,767
Salaries	$10,987,343
Wages	$22,129,921
Supplies, fuel, and purchased electric current, total	$20,239,598
Supplies	$11,666,227
Fuel	$3,772,514
Purchased electric current	$4,800,857
Contract work	$352,905

Equipment purchased during the year	$6,757,694
Horsepower rating of power equipment:	
Aggregate	517,804
Per wage earner	33.1
Fuel used:	
Coal (short tons)	652,427
Coke (short tons)	5,901
Fuel oil (gallons)	16,336,988
Gasoline and kerosene (gal.)	5,488,914
Sand and gravel produced:	
Tonnage (short tons)	165,526,074
Value (f.o.b., plant)	$100,016,527
Ratio (per cent) of cost of supplies, fuel, and purchased electric current to value of sand and gravel	20.2
Ratio (per cent) of wages to value of sand and gravel	22.1

Business Outlook

George E. MacIlwain, Cambridge Associates, Boston, Mass., spoke on the subject "The Next Six Months," stating that he believed we are at the beginning of a new business cycle and that the present cycle might be called the post-war period and really began in 1921 with gradually increasing volume of business up to approximately June, 1929, when the peak of volume of business was reached, and the decline began rather rapidly, as early as October, 1929, with the collapse of the stock market.

Mr. MacIlwain said that such a boom period had followed all previous wars but that this particular 1921-1929 cycle, lasting approximately 9½ years, was the longest in business history.

Other factors tending to promote this period of prosperity, he stated, were a great influx of gold in payment of foreign debts, housing shortages, automobile shortages, restriction of immigration, and the great expansion in instalment buying.

All these factors, he considered, were direct results of the war with the exception of instalment buying.

Expansion of public works during this period also stimulated all business, and the construction business of course in particular, so that his contention was that this particular period was really an abnormal one—super-normal—and that business men who could look back 17 years, to 1914, before the European war, could easily realize this point; but he doubted if any of his audience could look back that far in business experience, and consequently they stood in need of a word of caution in order to adjust themselves to what are considered normal business conditions.

Mr. MacIlwain emphasized the fact that foreign buying power was never lower than at the present moment, that there was no serious housing shortage, that Europe was practically rebuilt, and consequently business in the next few years would have to come frome the 120-odd million people in the United States and what business we could do with Canada and the Oriental countries, primarily.

As to the immediate outlook, he stated, that it was his opinion that some believed there would be an immediate upturn in business conditions about April 1, that the point of view of some others was a greater shrinkage in volume of business, new lower price levels and wage cuts before business could be turned to normal conditions. Mr. MacIlwain did not agree with economists of the latter type, preferring, he said, to take the middle ground, predicting that the total volume of business in 1931 would not be as great as it was in 1930, and that the first quarter of 1931 would not equal the first quarter of 1930, but that the last quarter of 1931 would be the year's best period. He believed the trend in business would be upwards after the close of the present year and would reach moderate levels by 1932 and that by 1933 we will again see a modest boom. He doubted if the total of three billion dollars which is reported to be ready for public works construction was an accurate estimate for 1931, and wondered how the public works expansion could continue without more attention being directed to taxation, saying that many states, cities and local bodies had gone into debt in lavish style and that some cities were defaulting their bonds.

He cautioned the producers against overexpanding in anticipation of public works building, as studies of this particular field by himself had convinced him that the industry was already over-planted and that future prospects in this field did not warrant very great optisism.

Mr. MacIlwain said he believed in a continuance of good business, but that there must enter into the picture a new kind of business based on sound economics which would tend to lift all business to higher levels and which in another ten years, he hoped, would result in a business frame of mind that would obviate a repetition of conditions which existed in 1930.

Sales Promotion

Bert Myers, engineer of materials and tests, Iowa State Highway Department, speaking on the subject "Utilization of Finer Sizes of Gravel in Concrete Highway Construction," gave the results of tests of concrete made with various proportions and sizes of Iowa gravel. Mr. Myers brought out first that the smaller sizes of coarse aggregates and the larger proportions of sand were used in his state because the scarcity of the limestone and coarse gravels made it more economical to design mixtures using small sizes than to transport coarser material long distances.

Six different specifications were introduced for the highway department based on varying proportions of concrete aggregates; no noticeable difference in strength has been observed in the use of these smaller sizes of aggregate; more cement, of course, is used than would be the case with coarser aggregates, but this is more economical than transporting coarse aggregates from distant points, he contended.

Mr. Myers briefly outlined the geographical features of his state to account for the type of gravel deposits found. This was chiefly interesting to the commercial producers as an advocacy of the use of miscellaneous local materials rather than carefully graded and uniformly graded commercial aggregate such as is being demanded in many other localities. Iowa's methods of concrete design which he described are being given wide publicity in engineering and highway magazines, and it is possible that they will have considerable influence in other localities.

Mr. Myers also in his paper described by means of lantern slides results obtained from the survey of concrete pavements in Iowa to determine the extent and cause of their cracking.

This survey indicated that mixtures of given strength having a minimum of small sizes gave a smaller distance between cracks than where a mix containing a larger proportion of coarse material was present. He did not, however, think that this was conclusive, as the studies have yet to be carried out to prove the "source" investigation of the gravels used in the construc-

Outline of Convention Report

WITHOUT REGARD to chronological order, and omitting much that was pleasant and interesting, we have attempted to give in this one issue a fairly comprehensive report of the convention proceedings which will be of the most immediate value to the industry. In doing so we have followed this outline:

1. ***GENERAL SYNOPSIS—Impressions of convention; census of the industry.***
2. ***SALES—Utilization of the finer sizes of gravel in highway construction; applicability of sand and gravel in correction of subgrade soils; bituminous roads; railway ballast.***
3. ***MANAGEMENT — Value of safety work; surety bonds and what they mean; organized credit efforts; progress in uniform cost accounting.***
4. ***OPERATION—Progress toward standard sizes; operating methods, equipments, costs at three typical plants in the industry.***
5. ***RESEARCH — Association's work reserved for comment in later issue; use of separate sizes in proportioning concrete, with discussion by two producers; deleterious substances, what are they?***
6. ***ASSOCIATION — Functions of associations in general; the report of the executive secretary; the work and accomplishments of the St. Louis district office.***
7. ***OFFICERS — RESOLUTIONS REGISTRATION—EXHIBIT.***

tion of these highways in order to decide how important a factor the type of aggregate is in determining the durability of the concrete.

H. S. Perry, assistant chief engineer, bureau of maintenance, Ohio Department of Highways, speaking on the subject "The Use of Sand and Gravel in Bituminous Work on Rural Highways," described in quite some detail the highway system of his state and the present attempt to surface the secondary highways with low-cost types of surfacing.

One of the interesting parts of his discussion pertained to crushed versus uncrushed aggregate on this type road, in which he stated: "We find that a 40% crushed material is essentially of worth equal to a 60%, and that 80% is essentially the equivalent of 100%, provided the uncrushed is confined practically to the fines. The question of the use of a crushed rather than an uncrushed aggregate must force the consideration of some other factors. The sealing of cracks in cement concrete, a brick refill job, would quite naturally be adapted to the use of an uncrushed material. Inasmuch as the function of a skin treatment should be not only to seal but also to produce a non-skid surface, it should secure an all-crushed cover, which is also more apt to be incorporated into the surface with less waste. In the case of crown-reduction work and the various types of full-cover black tops, the requirements of the top for durability seem to hinge in part at least on the kind and quantity of the bituminous material, type of construction, and not at all entirely on the angularity or roundness of the aggregate, or its relative or absolute size. There can be little doubt but that perfect angularity militates on the side of greater stability. The writer can point to numerous tops where 40% crushed aggregate was used, three to five years old, where injurious results attributable to lack in angularity, seem to be absent. On the other hand, the most choice aggregate cannot hold its own in the face of an over-abundance of bitumen, or of an excess of fines, or of a top sealed long before the volatile matters in the bitumen had been permitted to pass out."

The above statement, quoted verbatim, is not very specific; nevertheless, it is more or less typical of the paper as a whole which was very general in character and of specific help to sand and gravel producers only in laying emphasis on the secondary type of road which has been so very much to the fore in the last two or three years.

Subsoil Treatment

A paper entitled "Applicability of Sand and Gravel in the Correction of Sub-Grade Soils," by **F. V. Reagel**, engineer of material and tests, Missouri State Highway Department, described the use of sand and gravel as a recent development in the correction of sub-grades of roads.

Some of the factors involved, he said, were the overcoming of the tendency of clay soils to become plastic when wet and to change volume with varying degrees of moisture. These soils have cohesion with adsorbed water and resist drainage as well as having undesirable flowability. Such soils as have an abundance of cohesion have little or no stability and are particularly

H. S. Davison, treasurer

subject to frost action as well as to moisture. The object of the sand is to increase the internal friction of such soils to provide stability and break up their cohesiveness.

No specifications have yet been prepared to cover the treatment of sub-soil to give satisfactory results. But the subject is one that is capable of much scientific development and undoubtedly offers a considerable market for sand and gravel in the future.

It was stated particularly that the old type of "trench" gravel road, in which an excavation was made in clay soil and a bed of gravel placed in it, is now known to be just the opposite of good practice, because it made the maintenance of the gravel surface under such conditions practically impossible.

Drainage of the sub-grade is a much more favorable condition.

Pea gravel, sand or screenings, or an application of oil, all contribute to stabilization of clay sub-grades, and it was believed by the author of this paper that the application of granular material to all types of sub-grades would eventually become standard practice.

He concluded that soil science has come to stay and will eventually be very broadly applied to highway building.

Railway Ballast

The subject of ballast was treated only rather sketchily (with moving pictures) by J. L. Shiely, president of the J. L. Shiely Co., St. Paul, Minn., which operates a number of gravel ballast plants for the Great Northern Railway, extending from Minnesota to the Pacific Coast.

Management

Under the general subject of management we have included references to papers on safety, on surety bonds, and on cost accounting, all primarily problems of management.

The paper of **Ralph Dinsmore,** Warner Co., Philadelphia, Penn., entitled "The Value of Safety Work" was a very interesting and suggestive treatment of the subject by the personnel manager of one of the largest sand and gravel producers in the industry. As his paper will be published, complete, in a later issue of Rock Products, we will not attempt here to do more than touch on a very few of the high points.

These were that first of all the company should always install all possible safeguards, not particularly that they would eliminate accidents, but because they were evidence that the management of the company is doing its part in the prevention of accidents.

After several years' experience in accident prevention work, the Warner Co. is this year concentrating its efforts on the worker and foreman, with the purpose in mind of requiring the foreman to assume full responsibility for the security of his workmen.

Monthly comparative statements are being issued, showing the relative standing of all the foremen. Mr. Dinsmore said that he believed the foreman could do more effective safety work than any other man in the organization.

He also spoke of the value of competitions of various kinds, particularly that of the American Lime and Stone Co., a subsidiary, which has already been described in Rock Products.

Surety Bonds

A. M. Clark, vice-president of the National Surety Co., New York, N. Y., speaking on the "Function of the Bond in its Relation to Surety on Materials," devoted the larger part of his time to an explanation of the functions of a surety company, which he seemed to think were largely misunderstood by material producers. The chief reasons for the controversies which have come up between material producers and surety companies were due, he thought, to a misunderstanding of the surety company's function, which he stated is never to insure the payment on demand of the material bills of a contractor who has failed.

He explained the various types of bonds

and how these differed under the laws of the various states, but emphasized that in all types of surety bonds the primary obligation is always to the owner and that labor and material claims must always be secondary to the claims of the owner to indemnity for damage to him through failure of the contractor to keep his contract.

Mr. Clark believed that the material men, themselves, as well as other creditors of contractors, were in a considerable measure themselves to blame for the great number of failures of highway and public works contractors, which have taken place in the last year, because of over-extension of credit to them. In other words, it is as much the responsibility of the material men to exercise due caution in the extension of credit as it is of the surety company in bonding the contractor in the first place. He said no surety company that he knew of would knowingly bond an irresponsible contractor, but that, once having bonded a contractor, a surety company had no means of guarding against the contractor's over-expansion, and that this was as much the concern of the material producers as it was of the surety company.

He compared the surety bond with fire and liability insurance, explaining how no insurance company would insure a producer who did not take all reasonable precautions against fire and accidents; and that exactly the same thing was expected of the producer of materials in dealing with surety bond companies. They should exercise all necessary caution in extending credit to the principal and must exhaust all legal methods against the principal before the bonding company becomes liable; and the bonding company is never liable for the material bills alone.

It is evident from the questions which were asked Mr. Clark and answered satisfactorily by him that all felt much better acquainted with the ins and outs of surety bonds following his talk than prior to it.

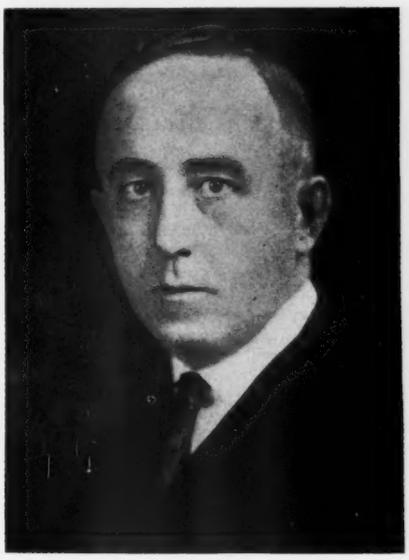
Credit Policies

G. C. Murray, manager of the National Builders' Supply Association, briefly outlined, extemporaneously, "Organized Credit Activities in the Building Industries"—the project of the National Builders' Supply Association to establish a uniform credit system for the construction industry which he stated had been approved by the judiciary department of the United States government at Washington, its essentials being that delinquent debtors should be posted by all members of the association and all members of the association should agree not to sell these debtors except for cash.

Mr. Murray suggested that a committee of the National Sand and Gravel Association be appointed to sit with similar representatives of other national associations in the construction industries to jointly adopt such a credit policy, which he said would be in harmony with the work being done by the Credit Information Bureau, affiliated with the Associated General Contractors of America.

Cost-Keeping

H. H. Stewart, J. K. Davison and Bro., Pittsburgh, Penn., reporting as chairman of the committee on uniform cost accounting, delivered a very comprehensive manual with the co-operation of J. R. Thoenen, U. S. Bureau of Mines, which in essentials was quite similar to that worked out for the crushed stone industry, also with the co-operation of J. R. Thoenen, a graph of which appears on page 79 of this issue. We will not attempt at this time to go into the matter any more fully, except to say that, like the plan suggested to the National Crushed Stone Association, it is designed to be sufficiently elastic to take care of both large and small operations.



Paul P. Bird, new member of executive committee

Costs are divided into six main divisions; namely:

1. Pit.
2. Plant.
3. Storage.
4. Delivery.
5. Administration.
6. Selling expense.

Operation

Under the general subject of plant operation, perhaps the most important subject discussed was the proposed standardization of sizes of gravel submitted by the Committee on Standard Specifications, of which Stephen Stepanian, vice-president and general manager of the Arrow Sand and Gravel Co., Columbus, Ohio, was chairman, the essence of which is as follows:

"At the direction of the convention of the association, in January, 1930, the proposed commercial sizes of gravel selected by the committee on standard specifications were circulated among the membership. A ballot on which they could indicate their approval or disapproval of (1) the policy of standardizing sizes, and (2) their reaction to the proposed sizes, was sent to every member. This action was in line with the suggestion of the Division of Simplified Practice of the Department of Commerce that the sand and gravel industry make an organized effort to reduce the number of commercial sizes of aggregates. A representative of the Division of Simplified Practice appeared before our committee on several occasions during the past two years and R. L. Lockwood, formerly of that division, presented a paper on "Simplified Practice in Industry" before the last convention.

"In an effort to obtain the opinion of the members of the association, five circular letters transmitting copies of the ballot were sent out. In spite of these and a number of special letters to individuals, the returns represented only 80% of the tonnage produced by the members of the association.

"A summary of the ballots, as of the present date, is given below.

"In seven instances of straight affirmative ballots, comments were made regarding the necessity of manufacturing certain special sizes in the locality served by the producer until specifications now in force are revised. In the case of split ballots there was noted an approval of the policy of simplification, but sizes somewhat different from those proposed were recommended. The recommendations presented no insurmountable difficulties, however.

"Recently the Division of Simplified Practice has suggested that this association, together with the National Crushed Stone Association and the National Slag Association, make a joint effort at simplification. Representatives of the three associations, Ross Colwell of the Division of Simplified Practice, and F. H. Jackson of the U. S. Bureau of Public Roads (also chairman of the committee on mineral aggregates of the Federal Specifications Board) met and considered what revisions in proposed sizes of the three interests would be necessary in order to unify them.

"The representatives of the slag and stone interests accepted, tentatively, the sizes which our committee had proposed, but in order to cover the uses of their product it was necessary to include several additional sizes.

RESULT OF BALLOT ON PRODUCTION OF SIZES

	Vote				Ballots
	Straight			Not	not
	Affirmative	Negative	Split	Voting	returned
Percentage of tonnage	72	0.1—	2	6	20
Percentage of members	58	0.8	3	11	27

The following summarizes the joint recommendation:

Sizes Recommended by N. S. G. A. Standards Committee

Square Sieves	Approximate Equivalent Round Screens
0—No. 4	0 - ¼-in.
No. 4— ½-in.	¼- ⅝-in.
No. 4— ¾-in.	¼- ⅞-in.
No. 4—1 -in.	¼-1¼-in.
No. 4—1½-in.	¼-1¾-in.
No. 4—2 -in.	¼-2⅜-in.
No. 4—2½-in.	¼-3 -in.
New Sizes	
½-1 -in.	⅝-1¼-in.
¾-1½-in.	⅞-1¾-in.
1 -2 -in.	1¼-2⅜-in.
1½-2½-in.	1¾-3 -in.
2 -3½-in.	2⅜-4¼-in.

"It has been proposed further, by the Division of Simplified Practice, that we go no farther in our attempt to obtain agreement of 80% of the membership as originally recommended by them, but that the entire program be turned over to them at this time. They feel that the percentage of approval obtained thus far is sufficient to justify submitting the sizes to the industry as a whole. With our approval they will go ahead with the necessary canvassing of the industry and the final conference of users and producers according to their usual procedure."

In connection with this problem the committee has to consider the points tabulated below.

Types of Construction

Provision is made for the use of gravel in the following types of construction:

1. Portland Cement Concrete Pavement and Raised Curb. Gravel, crushed stone or slag may be used as the coarse aggregate. Sand is required for use as fine aggregate unless special provisions are made. The gravel shall be of Grade A and conform to the requirements for Size 34. The sand shall conform to the requirements for Grade A.

2. Portland Cement Concrete Base, Flush Curbs and Headers. Gravel, crushed stone or slag may be used as the coarse aggregate. The gravel shall meet the requirements for Size No. 34 and Grade B. The sand shall meet the requirements specified for Grade B.

3. Portland Cement Concrete Structures. Gravel, crushed stone or slag may be used as the coarse aggregate. For mixtures of 1-5½ or richer, gravel shall conform to the requirements for Grade A and Size No. 4. Sand shall meet the requirements for Grade A. For mixtures of 1-6½ or leaner, Grade B gravel of Size No. 34 and Grade B sand may be used.

4. Concrete Pipe (Plain or Reinforced), Bridge Railings and Lamp Standards. Gravel, crushed stone or slag may be used as coarse aggregate. Gravel shall conform to the requirements for Grade A or Crushed Rock—Special, and be of No. 46 size. The sand shall be Grade A. Also No. 4 gravel is allowed in bridge railings and lamp standards.

5. Manholes, Catch Basins, Inlets and Scuppers. Gravel shall conform to the requirements of Grade B and No. 34 size. Sand for concrete shall meet the requirements of Grade B. Sand for brick masonry shall meet the requirements for grout.

TECHNICAL investigations carried on by the association in cooperation with other bodies included work on the recommendation of simplified sizes. This matter, after gathering the consensus of opinion of the members, has been turned over to the Division of Simplified Practice of the Federal Specifications Board, which is also endeavoring to get an agreement of sizes from producers of other materials.

Three Valuable Papers on Operation

Three very excellent papers prepared by operating men in the industry acting as consulting engineers for the United States Bureau of Mines, two of which papers have already been published by the United States Bureau of Mines, formed the main part of the session on operating costs and problems.

The first of these papers on the dredging operations of the Ohio River Sand Co., of Louisville, Ky., described the operation historically, geologically and in great detail as to equipment, methods and costs. These operations include two large ladder dredges and a small pump dredge which operated only part of a season. As this paper will be published in a later issue in full, we will pass over it at this time except to say that Capt. Duffy's paper was criticized as not bringing out all the hazards, risks and difficulties encountered by river operators; that from a reading of his paper the uninitiated would gain the impression that there was little to the operation of river dredges except to invest one's money and market the material. It was said that he made no mention of the floods and storms and other things that make the life of a river gravel operator one continual torment.

Victor Milkowski of the Morris Machine Works took exception to the comparisons in Capt. Duffy's paper between a very large capacity ladder dredge and a low capacity pump dredge, saying that such a comparison, to be fair to a pumping operation, would have to be made with a 30-in. pump dredge. In this discussion it was developed that the pump dredge had been in operation only a few weeks, while the ladder dredge had operated a full season.

Description of Menantico Plant

The second paper on the program was a description of the Menantico Sand and Gravel Co. operation at Millville, N. J., by Hugh Haddow, Jr., vice-president and general manager of the company.

As very great interest was displayed in this paper and it was quite evident that nearly everyone present was particularly interested in the production, preparation and marketing of special sands, we are reproducing this paper in full on another page.

Numerous questions were asked Mr. Haddow as soon as he had finished reading his paper, and it was obvious that various other producers were seeking even more specific information in regard to the details of the preparation and marketing of special sands. Part of this discussion had to do with the moisture content of the sand, and it was developed that the saturated sand contained about 8% water by weight and about 5% after having been in storage. Mr. Haddow said it was turned out of his rotary direct heat dryers absolutely dry at an expenditure of about 15 lb. of coal per 2000 lb. of moisture removed. Mr. Haddow expressed the belief that 30-mesh material would dry easier than 8-mesh and said his material was approximately 95% silica, with the other 5% mostly silicate of alumina and iron oxide. It developed also in the discussion that undoubtedly sands differed in their ability to carry moisture, depending somewhat on their composition.

Asked about his screening operations and why he continued to use gravity screens in place of vibrating screens, he stated that he had never been sold on the economy of vibrating screens and that for his particular purpose gravity screens were answering every purpose.

Asked as to his market for fine sand, he said it was sold principally for foundry sand and fertilizer filler and that for sand sold for fertilizer filler he obtained from 60 to 75 cents per ton f.o.b. plant. He also said that his most lucrative market was sand for water-works sand filters; that he sometimes made shipments over long distances for this purpose. This business had been developed through long contact with water filtration

POINTS CONSIDERED BY STANDARD COMMITTEE

Standard Size	Amounts passing each screen—(Circular openings) 4-in.	3-in.	2½-in.	2-in.	1½-in.	1-in.	¾-in.	½-in.	¼-in.	10*
1	95–100	.....	0–10	.....	.....	.....	.....	.....	.....	.....
2	.....	95–100	.....	0–10	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	95–100	.....	0–10	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	95–100	75–90	20–40	0–10	0–5
4X	.....	.....	.....	.....	.....	95–100	75–90	25–50	10–25	0–10
6	.....	.....	.....	.....	.....	.....	.....	95–100	0–50	0–10
34	.....	.....	.....	95–100	80–100	.....	25–45	.....	0–5	.....
34X	.....	.....	.....	.....	95–100	.....	40–70	.....	0–20	0–10
46	.....	.....	.....	.....	.....	.....	95–100	35–65	0–25	0–5

*Sieve with square openings.

engineers and manufacturers who knew just exactly what his sand would do, and consequently, seeing that the cost of the sand itself was a minor consideration in the total cost of a filter plant, would sooner pay the freight rate on a long shipment for his sand than to use a sand of unknown quality.

Mr. Haddow also described the type of barge and pontoon that he uses as those which serve the purpose best under the conditions and are the easiest to manufacture in his particular locality.

The third paper in the group on operation was on the operations of the Northern Gravel Co., West Bend, Wis., by **F. A. Bingham,** superintendent of the company.

Mr. Bingham said, in substance:

Gravel Operations of Southeastern Wisconsin

The development of the gravel deposits in southeastern Wisconsin, other than those in the vicinity of Beloit and Janesville, dates back about 20 years and probably first centered in a commercial way about Waukesha, Wis., which is approximately 14 miles due west of Milwaukee.

The development has been very rapid for the past 15 years occasioned largely by the construction of concrete roads, which was influenced materially by the increasing use of concrete for all sorts of structural work.

Geology

The principal sand and gravel deposits of southeastern Wisconsin occur in a glacial moraine beginning a little south of Green Bay and extending about 100 miles due south, tapering out in the vicinity of Burlington. The size of the moraine varies, but it is comparatively narrow, being probably not over five miles in width at the widest part. The moraine at points reaches a height of over 100 ft., and in locations where the height is great there is almost always a high percentage of large rock carried in the deposit. The material in the main section or hills of the moraine is of excellent quality, but on the edges of the moraine, where the deposits go below the fields, most of the material is rather badly contaminated with clay.

Practically all of the deposits are worked above water line so there is little evidence as to the deposit of gravel below water-line, but generally speaking it is probably not great, as limestone quite frequently comes to the surface, especially along the area south of Fond du Lac.

The deposit of the Northern Gravel Co. described below occurs just north of Barton, which is about mid-way of the length of the moraine.

Description of the Barton Deposit

The deposit of the Northern Gravel Co. is a large hill varying from 70 to 100 ft. in height, approximately 3000 ft. in width at the base and lying almost due north and south of the property. The hill has been opened up by steam shovel work for a distance of about half a mile and is comparatively uniform in composition and relative proportions of sand and gravel carried.

The overburden is very light, averaging about 2 ft. in thickness and ordinarily consisting of black sandy loam underlaid with red clay in the low spots. Some of the low spots are of considerable depth, and in places 5 to 6 ft. of red clay have been encountered.

The size of material in the deposit varies from sand up to heavy boulders. Most of the boulders are smaller than 18 in. in diameter, but rock up to 6 and 8 ft. in length by 2 ft. in thickness and 3 to 4 ft. in width are encountered.

The gravel is mainly of hard limestone formation, but there is much granite, quartzite and some trap rock. The proportion of gravel in the deposit runs very uniform, taking the deposit as a whole, and about two parts of gravel are produced for each part of sand.

UNUSUAL interest was manifested in papers on plant design and operation, especially with reference to the reduction of operating costs. Some valuable papers were presented along this line and were freely discussed by the members.

Mining Methods

The stripping of the Northern Gravel Co.'s deposit is done with a 20-B Bucyrus revolving shovel on caterpillars, this machine being equipped with both steam shovel boom and dragline boom and the two booms shifted from time to time as the nature of the moraine changes. Stripping is hauled from the above machine to a spoil dump in 5-yd. dump trucks.

The loading of raw sand and gravel from the plant is done by a 50-B Bucyrus revolving shovel mounted on caterpillars and the bank as a rule caves fairly freely, but because of its height one man equipped with a long spike-pointed pole is generally kept about the shovel to "tease" the bank, largely as a safety measure.

The raw material is conveyed to the plant in 7-yd. side-dump cars running on standard-gage track and hauled by 11-ton Milwaukee gasoline locomotives. Both of the above shovels are steam operated.

Crushing and Washing Plant

On arrival at the plant the 7-yd. dump cars discharge over an inclined grill or grizzly having about 4-in. openings between the bars, the oversize running by gravity to a No. 8 Gates crusher, which reduces the same to about 3½-in. size. The undersize from the grizzly falls to a feeding bin from which the material is fed on to a 30-in. inclined belt conveyor by a reciprocating feeder, and as the No. 8 crusher sets opposite this feeder its product joins that of the feeder on the 30-in. belt.

The above-mentioned 30-in. belt delivers to an equalizing bin at the foot of the main 30-in. belt leading to the washing plant. This main 30-in. conveyor is about 250 ft. in length and inclined about 18 deg. from the horizontal.

At the top of the washing plant the 30-in. main conveyor discharges on to an inclined bar screen or grizzly having about 2½-in. openings and whose purpose is to keep the large rock out of the revolving screens. The oversize from this grizzly flows through an inclined chute to the feeding bins of the secondary crushers. The undersize from the above-mentioned grizzly meets a stream of about 1500 gal. per min. of fresh water in the preliminary washing box under the flows into the first two washing and sizing screens.

All washing and sizing screens are of the Gilbert conical type, the first two screens being 48 in. in diameter at the small end by 5 ft. 6 in. in length and are ordinarily equipped with 2½-in. round hole perforations.

The oversize from the first row of screens flows by gravity to the feeding bin of the secondary reduction crushers.

The secondary reduction or finishing is done by two No. 5 Gates crushers set to make about a 1¾-in. product and discharging on to a 16-in. belt conveyor which delivers their product into the main feeding hopper under the primary grizzly described above, where it mixes with the raw feed and is returned to the head of the plant.

The second row of washing screens is 36 in. in width by 36 in. in length and is ordinarily equipped with 1½-in. round hole perforations. The rejections of these screens form the largest size of gravel ordinarily produced. The undersize from the second row of screens flows to a third row of screens which are ordinarily equipped with 1-in. round hole perforations. The rejections of these screens form the second largest size of gravel produced.

The undersize from the third row of screens flows to a fourth row, which are 36-in. by 36-in. in length and are ordinarily equipped with ½-in. round hole perforations. These screens carry outer jackets which are ordinarily equipped with 5/16-in. round hole perforations, so these screens produce two gravel products, the first being material ranging from 1 in. to ½ in. in size and the second from ½ in. to 5/16 in. in size, both of which are stored in separate bins.

The undersize from the above mentioned final row of screens flows to two drag-chain sand dewatering boxes which are unusually

long, being about 22 ft. centers, which results in giving a very clean and dry sand which is stored in its own bin.

The water rejected from the sand boxes flows to a spill pond and is not used again.

A recovery of approximately 95% is realized, that is, the very fine sand and small amount of loam washed out of the gravel amounts to only in the neighborhood of about 5% of the total feed to the plant.

The storage bins of the plant are directly below the screens and have a total capacity of about a thousand tons.

Railroad cars and trucks are loaded for shipment by means of side-loading spouts on the bins controlled by quadrant gates and the various sizes of materials are carefully measured on shipping to conform with the specifications for the different work for which they are to be used.

The washing plant and crushers are electrically driven by 3-phase, 60-cycle motors, all motors larger than 30 hp. operating at 2300 volts.

Power is purchased from the Wisconsin Public Utility Co. at a cost of approximately 3c per kw.h.

The maximum power demand of the plant, including the pump which furnishes the washing water, is about 160 kw. and 0.75 kw. of electrical energy is used per ton of finished sand and gravel produced.

Water Supply

An excellent supply of water has been made available by digging a lake adjacent to the washing plant and nothing but clear fresh water from this lake is employed in the washing operation.

An electrically driven centrifugal pump discharging through a 10-in. pipe line to the head of the washing plant delivers about 1500 gal. of water per min. to the head of the plant, where it is discharged into the screens at a pressure of about 50 lb. per sq. in.

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Storage for approximately 60 gondola cars is provided by the trackage south of the plant. This trackage is divided into four lines so that solid bottom gondolas and hopper bottom cars may be kept separately, and the fourth track parallels the stockpile.

A gasoline-driven locomotive is provided for handling cars on the switch tracks and moving them past the washing plant for loading.

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Close to 100,000 tons of finished material are regularly carried in stock, the material being transported from the washing plant to the stockpiles in gondola cars hauled by the above mentioned switching locomotive. The material is then unloaded into the piles with a 30-ton railroad type locomotive crane having a 55-ft. boom and 1½-yd. clamshell bucket. The various sizes of sand and gravel are kept in different piles and the total length of the storage system is close to 1500 ft.

Material is loaded out of the stockpile for shipment by the above mentioned locomotive crane and shipments are made during every month of the year.

The above storage system permits operating the plant almost independently of the market demands and filling orders almost independently of the plant's ability to produce; that is to say, when orders are restricted the excess production of the plant goes into the storage piles, while when orders exceed the capacity of the plant material is shipped out of the storage piles.

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From 18 to 20 men are required to operate the plant and deposit and the rates for all labor are about the same as prevail throughout the Wisconsin district, starting with 45 to 50 cents per hour for common labor.

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All machinery is carefully guarded in accordance with the recommendations of the inspectors of the State of Wisconsin Compensation Board.

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Supervision	3c	6%
Direct production cost	30c	60%
Sales expense	5c	10%
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Depletion	1c	2%
Liability and fire insurance	1c	2%
Local taxes	1c	2%
Plant office and supplies	1c	2%
Advertising	1c	2%
Executive officers' salaries and expenses	3c	6%
Total cost	50c	100%

It will be noted from the above that the direct cost of manufacturing washed sand and gravel, that is, labor, power, repairs, supplies and supervision of plant operation, constitute 30c or 60% of the total cost; and to this amount must be added 20c per ton to cover the cost of selling, depreciation and the various other items that enter into the cost of conducting the business.

Research

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The Use of Separated Sizes of Coarse Aggregate in the Proportioning of Concrete for Highway Construction

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What Can Be Accomplished by Use of Separated Sizes

Two things can be accomplished by shipping the coarse aggregate in two or more sizes and combining them at the batching plant. (1) A better grading, having a lower void percentage, may be secured than would be possible by taking the run of the pit. (2) The evil of segregation of sizes in stock piles and cars can be minimized, thus insuring the delivery of more uniformly graded aggregate to the individual batches. Whether or not this will result in more uniform concrete depends upon the importance of the coarse aggregate grading in the particular concrete mixture being used.

Theory of Concrete Mixtures

Before attempting to discuss the conditions under which the use of separated sizes of coarse aggregate may be desirable, it will be necessary to review briefly the relationship between composition and quality of concrete.

The Sub-Committee on Design of Concrete of Committee C-9 on Concrete and Concrete Aggregates, of the American Society for Testing Materials, stated in the committee report for 1927, that—

"The strength of concrete made from sound, durable materials depends upon:

"(a) The extent to which the solid particles are glued or bonded together.

"(b) The actual amount of solid material in the concrete.

"Assuming a given set of aggregates and the same conditions of fabrication, two of the most important factors which affect the bond between particles are:

"1. The proportion of cement in a given quantity of concrete.

"2. The amount of mixing water."

SO much has been done in the way of research in concrete aggregates in the past year that much of the time of the convention was devoted profitably to this subject. Some of this matter is presented herewith and other phases of it will be given in a later issue.

The extent of the bond between the particles can be expressed by the amount of cement in a unit volume. The amount of solid material in a unit volume of concrete can be expressed either by the sum of the absolute volumes of the cement and aggregates in a unit volume or by the difference between the unit volume and this sum, which is the void space occupied by water and air.

The ratio of the absolute volume of cement to the absolute volume of all solid particles in a unit volume or the ratio of the cement to the void space is a function, therefore, of the strength of the concrete. This has been demonstrated by a number of investigators. In plastic mixtures in which sufficient water is present to fill all of the void space, but in which no water is lost, the volume of void space can be replaced in this ratio by the volume of the mixing water used in making the unit volume of concrete. It is thus seen that the amount of mixing water practically controls the volume of void space and therefore the water-cement ratio is also a function of the strength. Fig. 1 shows the relation of void-cement and water-cement ratios to strength for a typical set of data. It is apparent from these basic considerations that the grading of the aggregates or the relation between fine and coarse aggregates is not a fundamental strength factor in plastic mixtures. Nevertheless, grading is a very important factor in the design of mixtures for economy and workability, although there are many combinations of aggregates that will produce concretes of the same strength so long as the fundamental water-cement or void-cement relation is not changed.

Absolute Volume Not the Same as Loose Volume

In order to produce uniform concrete it is necessary that the absolute volumes of the various ingredients be the same in all batches. Success depends upon the accuracy of measurement. With measurements of aggregates by loose volume, it is practically a foregone conclusion that the absolute volumes of the aggregates will be different in every batch, since any change in the grading will affect the absolute volumes of the particles measured out. Under such conditions the use of separated sizes of coarse aggregate would reduce the variation in grading of the aggregates and no doubt the uniformity of the concrete would be improved. However, non-uniformity of batches due to variation in absolute volumes of aggregates can be practically eliminated by weighing the aggregates, and since weighing is rapidly coming into general use on pavement work, the use of separated sizes for the purpose of improving batches measured by loose volume will not be considered further in this discussion.

The required proportions of materials by absolute volume can be maintained from batch to batch within very narrow limits when account is taken of the specific gravity and free moisture content of the aggregates. In the study of concrete mixtures, the relations between cement, water and total aggregate have been much discussed, and methods for design are available. The relation between the fine and coarse aggregates has not been given so much thought, but it is in this feature of the design of mixtures that the use of separated sizes of coarse aggregate is of importance.

In Bulletin No. 137, Engineering Experiment Station, University of Illinois, on "The Strength of Concrete, Its Relation to the Cement, Aggregate and Water," Talbot and Richart report test data and discuss the problem of determining the maximum permissible amount of coarse aggregate.

In general the better graded is the coarse aggregate, the smaller will be the voids and the less mortar will be required to make concrete of maximum density. As such a mixture will require a minimum of cement for a given water-cement ratio or for workability, it will often be the most economical mixture possible with the available materials. In order to assure the uniformity of such a closely defined mixture, the use of separated sizes of coarse aggregate is advantageous. Mixtures so closely proportioned may have such a large ratio of coarse aggregate to mortar that stock pile or car segregation might easily cause a condition in which the mortar could not occupy all of the space between the pebbles. This

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Theory of Concrete Mixtures

Before attempting to discuss the conditions under which the use of separated sizes of coarse aggregate may be desirable, it will be necessary to review briefly the relationship between composition and quality of concrete.

The Sub-Committee on Design of Concrete of Committee C-9 on Concrete and Concrete Aggregates, of the American Society for Testing Materials, stated in the committee report for 1927, that—

"The strength of concrete made from sound, durable materials depends upon:

"(a) The extent to which the solid particles are glued or bonded together.

"(b) The actual amount of solid material in the concrete.

"Assuming a given set of aggregates and the same conditions of fabrication, two of the most important factors which affect the bond between particles are:

"1. The proportion of cement in a given quantity of concrete.

"2. The amount of mixing water."

SO much has been done in the way of research in concrete aggregates in the past year that much of the time of the convention was devoted profitably to this subject. Some of this matter is presented herewith and other phases of it will be given in a later issue.

The extent of the bond between the particles can be expressed by the amount of cement in a unit volume. The amount of solid material in a unit volume of concrete can be expressed either by the sum of the absolute volumes of the cement and aggregates in a unit volume or by the difference between the unit volume and this sum, which is the void space occupied by water and air.

The ratio of the absolute volume of cement to the absolute volume of all solid particles in a unit volume or the ratio of the cement to the void space is a function, therefore, of the strength of the concrete. This has been demonstrated by a number of investigators. In plastic mixtures in which sufficient water is present to fill all of the void space, but in which no water is lost, the volume of void space can be replaced in this ratio by the volume of the mixing water used in making the unit volume of concrete. It is thus seen that the amount of mixing water practically controls the volume of void space and therefore the water-cement ratio is also a function of the strength. Fig. 1 shows the relation of void-cement and water-cement ratios to strength for a typical set of data. It is apparent from these basic considerations that the grading of the aggregates or the relation between fine and coarse aggregates is not a fundamental strength factor in plastic mixtures. Nevertheless, grading is a very important factor in the design of mixtures for economy and workability, although there are many combinations of aggregates that will produce concretes of the same strength so long as the fundamental water-cement or void-cement relation is not changed.

Absolute Volume Not the Same as Loose Volume

In order to produce uniform concrete it is necessary that the absolute volumes of the various ingredients be the same in all batches. Success depends upon the accuracy of measurement. With measurements of aggregates by loose volume, it is practically a foregone conclusion that the absolute volumes of the aggregates will be different in every batch, since any change in the grading will affect the absolute volumes of the particles measured out. Under such conditions the use of separated sizes of coarse aggregate would reduce the variation in grading of the aggregates and no doubt the uniformity of the concrete would be improved. However, non-uniformity of batches due to variation in absolute volumes of aggregates can be practically eliminated by weighing the aggregates, and since weighing is rapidly coming into general use on pavement work, the use of separated sizes for the purpose of improving batches measured by loose volume will not be considered further in this discussion.

The required proportions of materials by absolute volume can be maintained from batch to batch within very narrow limits when account is taken of the specific gravity and free moisture content of the aggregates. In the study of concrete mixtures, the relations between cement, water and total aggregate have been much discussed, and methods for design are available. The relation between the fine and coarse aggregates has not been given so much thought, but it is in this feature of the design of mixtures that the use of separated sizes of coarse aggregate is of importance.

In Bulletin No. 137, Engineering Experiment Station, University of Illinois, on "The Strength of Concrete, Its Relation to the Cement, Aggregate and Water," Talbot and Richart report test data and discuss the problem of determining the maximum permissible amount of coarse aggregate.

In general the better graded is the coarse aggregate, the smaller will be the voids and the less mortar will be required to make concrete of maximum density. As such a mixture will require a minimum of cement for a given water-cement ratio or for workability, it will often be the most economical mixture possible with the available materials. In order to assure the uniformity of such a closely defined mixture, the use of separated sizes of coarse aggregate is advantageous. Mixtures so closely proportioned may have such a large ratio of coarse aggregate to mortar that stock pile or car segregation might easily cause a condition in which the mortar could not occupy all of the space between the pebbles. This

would remove the mixture from the class of plastic mixtures with completely filled voids and its strength would not be predictable. Hence the need with such mixtures for precautions against segregation of sizes.

On the other hand it is obvious that the type of mixture which combines known quantities of varying sizes of coarse aggregate would not be subject to this contingency and precautionary measures for the same purpose would not be needed.

In concrete mixtures in which the relation of mortar to coarse aggregate is such that variations in the grading of the coarse aggregate can cause a deficiency of mortar to fill all of the voids, the use of separated sizes is highly desirable.

In concrete mixtures in which the mortar is sufficient to fill all of the voids irrespective of the probable variations in the grading of the coarse aggregate, the use of separated sizes does not appear to be particularly advantageous.

These statements are based upon the fact that mixtures can be designed in either case to yield concrete of the desired strength and durability.

The question as to which type of mixture to use is an engineering problem in the use of the available materials to the best advantage in producing concrete of the required quality. The controlling factors to be given consideration in a study of this problem are:

1—Cost of materials and handling.
2—Effect of batch size upon cost.
3—Workability.
4—Durability.
5—Strength and uniformity.

Cost of Materials and Handling

The reports from states where separated sizes have been used indicate that there has been no appreciable rise in cost on this account. On one project on which two kinds of coarse aggregate were handled, the contractor reported that his costs were not increased. In this case the lack of extra expense was ascribed to the use of a locomotive crane, the mobility of which made it possible to serve all of the loading bins from the cars or stock piles expeditiously with one machine. The cost of handling the material in separated sizes will depend upon the contractor's plant layout and available equipment.

The cost of production and loading at the pit or quarry will depend upon the facilities available for screening, storing and loading. Probably most commercial producing plants are so arranged that shipment in several sizes will not entail additional cost.

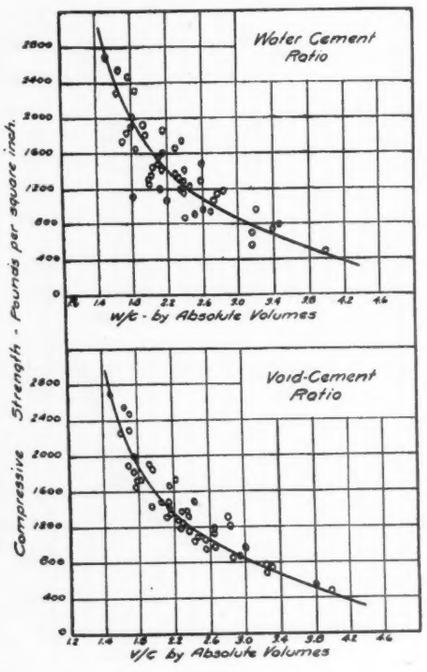


Fig. 1

THE use of separate sizes of coarse aggregate in proportioning mixtures for highway construction was discussed in considerable detail by R. W. Crum. His investigations tend to show that separate sizes of coarse aggregate will produce the best results where very close proportioning is desired.

In general it may be expected that, under competitive conditions, the cost of requiring the delivery of coarse aggregate in two or three sizes will have only a small effect or none at all upon the prices tendered.

Effect of Batch Size Upon Cost

If it were necessary to adhere to the use of a certain number of whole bags of cement per batch, there might be some advantage in one or the other of the types of mixture under discussion. Under this condition the mix which would allow the use of batches nearest in size to the capacity of the mixer would tend to the greater daily production and hence lower unit cost. However, the use of bulk cement is rapidly increasing and even when cement in bags is used, it is easy to weigh out whatever additional part of a bag is needed to make the right size of batch. It is safe to assume that both types of mixtures can be put on a par in so far as this condition is concerned.

Workability of Concrete

On modern paving construction it is necessary for proper workability to control the consistency of the concrete within narrow limits. Experience has demonstrated that mixtures containing a very high percentage of coarse aggregate may be quite workable, if the coarse aggregate is uniformly well graded. Separated sizes of coarse aggregate should be used to secure the greatest advantage from this type of mixture.

An advantage of the use of mixtures containing higher percentages of mortar is the ease with which workability can be maintained without extra precautions.

Durability

The only question of durability that may arise concerns the possible effects of the two types of mixtures upon volume changes. Shrinkage stresses appear to increase in rich concrete with increase in cement resulting in transverse cracks at shorter intervals.

Experience in Iowa with a series of mixtures in which the ratio of fine aggregate to total aggregate ranged from 0.33 to 0.50 indicates that considerably more mortar must be used than is needed for insurance against bad results due to segregation of aggregates before any difference is noted in the spacing of transverse cracks. The results of crack surveys are shown in Table I.

There does not appear to be any choice between the first two mixes. The first, 1-1.71-3.47, has the ratio of fine to coarse aggregate of 1 to 2 that has been extensively used in the past. With some materials and methods of handling this mixture may be reasonably safe against non-uniformity due to segregation of coarse aggregate, but with aggregate of large maximum size and ordinary handling, the use of separated sizes would give excellent assurance of uniformity. However, if the separated sizes were to be used, a design with even more coarse aggregate might be warranted. The second mixture, 1-1.93-2.91, contains enough mortar to make it safe against non-uniformity due to segregation of coarse aggregate, and in view of these data there does not appear to be any need for hesitation in its use.

If economy indicates the desirability of using mixes such as the other two containing yet more mortar, consideration must be given to the fact that there would probably be more transverse cracks or joints. There is some difference of opinion as to whether or not this is particularly objectionable. However, since the second mixture has sufficient mortar for assurance against segregation, the question does not need to be gone into further in this place.

The data quoted are from gravel aggregate jobs. The data from work on which crushed limestone was used show the same relative conditions.

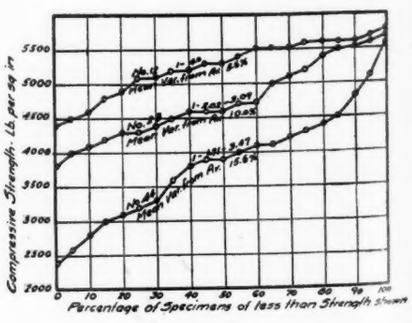


Fig. 2

TABLE I—LENGTH OF SLABS IN CONCRETE PAVEMENT AS AFFECTED BY AMOUNT OF SAND IN MIXTURE. PAVEMENT LAID WITHOUT JOINTS EXCEPT FOR TEMPORARY SUSPENSION WORK

	Gravel Aggregate			
Mixture by weight	Ratio sand to total aggregate	Year built	Miles of pavement	Average slab length
1-1.71-3.47	33	1925	6.16	48.91
1-1.93-2.91	40	1925	.....	.....
1-2.06-2.53	45	1925	.....	.....
1-2.17-2.17	50	1925	8.42	27.70
1-1.71-3.47	33	1927	17.6	62.3
1-1.93-2.91	40	1927	11.6	70.5
1-2.06-2.53	45	1927	1.1	37.9
1-2.17-2.17	50	1927	.....	.....
1-1.71-3.47	33	1928	36.3	61.6
1-1.93-2.91	40	1928	135.9	64.9
1-2.06-2.53	45	1928	58.0	44.3
1-2.17-2.17	50	1928	36.3	36.1

Strength and Uniformity

Table II from a report on "Control of Materials and Mixtures for Concrete for Pavements," Proceedings of the Ninth Annual Meeting, Highway Research Board, summarizes the experience in Iowa in 1928 with various mixtures. These data demonstrate that the same class of concrete was produced with each of the mixtures.

Sixteen of the 35 projects on which the proportion 1-1.93-2.91 prevailed, used gravel for coarse aggregate. The average strength was: Transverse, modulus of rupture, age—10 days, 601 lb. per sq. in. Compression, age—27 to 30 days, 4610 lb. per sq. in.

The uniformity attained on a job in so far as revealed by the daily test specimens may be expressed by the mean percentage of variation from the average strength of the individual specimens. The lower the value of this expression the greater is the degree of uniformity and vice versa. Table III shows the degree of uniformity attained on the same jobs as in Table II.

The uniformity for different jobs may be also compared graphically by plotting the percentage of the specimens having strengths less than the corresponding strength shown on the diagram as in Fig. 2. This illustrates what may be expected from the use of mixtures containing an excess of mortar.

Fig. 3 shows the uniformity attained on two paving jobs in Wisconsin on one of which separated sizes of coarse aggregate were used. These jobs were practically the same in all respects other than the use of separated sizes. It will be noted that for the most part they exhibited about the same degree of uniformity in the specimens, but that as might be expected, the job on which the single size aggregate was used had considerably more specimens departing widely from the average.

Analysis of Cost of Materials for Typical Conditions

From the foregoing discussion of costs, workability, durability, strength and uniformity, it appears that:

(1) The use of separated sizes of coarse aggregate is practicable.

MR. CRUM gave valuable data on the effect of various mixtures on concrete paving, arriving at a number of conclusions, one of which is that mixtures containing high percentages of coarse aggregates can be used with uniformity of results if the coarse aggregate is furnished in several sizes.

(2) Mixtures containing high percentages of coarse aggregate can be used with uniformity in results if the coarse aggregates are furnished in several sizes.

(3) Mixtures with an excess of mortar can be used to produce uniform results without dependence upon control of the aggregate grading.

The controlling factor in the choice of type of mixture under specific conditions is largely that of economy in the composition of the concrete.

An analysis of costs for materials under two typical conditions is as follows:

We will assume that by means of the necessary tests and computations we have designed a series of mixtures of the available materials that may be expected to make concretes of equal strength.

(1) 1-1.4-4.2 water 5.25 gal. per bag of cement.

(2) 1-1.71-3.47 water 5.25 gal. per bag of cement.

(3) 1-1.92-2.91 water 5.25 gal. per bag of cement.

The estimated quantities of materials per cubic yard of concrete for these mixtures are:

	1	2	3
Cement—bbl. per cu. yd.	1.55	1.64	1.72
Sand—tons per cu. yd.	.41	.53	.63
Gravel—tons per cu. yd.	1.22	1.07	.94

Case (1) In comparing the costs of materials for the three proportions, let us first assume to be in a region in which the prices of sand and gravel are not far apart with unit prices as follows:

Cement	$2.15 per bbl.
Sand	1.20 per ton
Gravel	1.40 per ton

The cost of materials for the three mixes would be as follows:

	1	2	3
Cement	$3.33	$3.53	$3.70
Sand	.49	.64	.76
Gravel	1.70	1.50	1.32
	$5.52	$5.67	$5.78

The first mix 1-1.4-4.2 is the cheapest, but on account of the high proportion of coarse aggregate, it will be necessary for the coarse aggregate to be very well graded, the voids in the coarse aggregate will be filled with mortar, and that a workable mixture will be produced. On both accounts only small variations in the grading of the coarse aggregate can be tolerated. Assuming that all of the mixing water would stay with the concrete, and the air voids would be practically negligible, the composition of this concrete would be as follows:

ONE CUBIC YARD

Cement	.110 cu. yd.
Sand	.182 cu. yd.
Gravel	.547 cu. yd
Water	.161 cu. yd.
	1.000 cu. yd.

The mortar part of the mixtures would occupy 0.453 cu. yd. If the gravel as combined and measured should be so well graded that the voids are 30%, the 0.547 cu. ft. of gravel particles would carry with them 0.235 cu. yd. of void space. The .453 cu. yd. of mortar would easily fill this void space and take care of the bulking of the gravel when made into concrete. On the other hand if stock pile segregation or some

TABLE II—EFFECT OF VARIOUS BASE PROPORTIONS UPON STRENGTH—IOWA 1928

		Average strength tests					
		Transverse modulus of rupture, lb. per sq. in.			Curing, lb. per sq. in.		
Base proportions by weight	Number of projects	Maximum	Minimum	Average	Maximum	Minimum	Average
1-1.71-3.47	5	725	527	652	5048	3776	4658
1-1.93-2.91	35	714	492	595	5404	3600	4497
1-2.06-2.53	13	679	450	580	5058	4061	4496
1-2.17-2.17	6	631	517	576	4962	4168	4598

TABLE III—UNIFORMITY OF SPECIMENS TESTED ON CONCRETE PAVEMENT JOBS—IOWA 1928

		Average variation of individual specimens from job averages—per cent.					
		Transverse tests age 10 days			Crushing tests age 27 to 30 days		
Base proportions	Number of projects	Maximum	Minimum	Average	Maximum	Minimum	Average
1-1.71-3.47	5	13.8	6.6	9.8	15.6	5.3	10.3
1-1.93-2.91	35	17.8	5.5	9.5	17.2	5.1	9.3
1-2.06-2.53	13	14.8	4.6	10.1	12.2	5.9	9.2
1-2.17-2.17	6	14.7	7.3	11.0	13.9	7.3	10.8

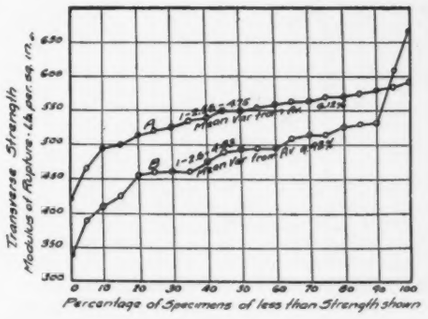


Fig. 3

other reason should cause batches of gravel to be delivered with voids as high as 45%, not an unusual condition, the 0.547 cu. ft. of gravel particles would carry 0.45 cu. yd. of void space. Since it is impossible to arrange the gravel particles in concrete as closely as they are in the pile, the 0.453 cu. yd. of mortar would be insufficient to completely fill the voids. This would result in non-uniform concrete unless the proper grading were insured by some means such as the delivery and recombining in the batch of several sizes of coarse aggregate. The saving in cost by using this economical mixture would probably more than pay for any extra cost due to the handling of the several sizes.

Case (2) Let us now assume that we are in a region in which the cost of the coarse aggregate is high as compared with that of sand, with unit prices as follows:

Cement	$2.25 per bbl.
Sand	.75 per ton
Gravel	2.00 per ton

In this case the costs of materials for the same three mixtures would be as follows:

	1	2	3
Cement	$3.49	$3.69	$3.87
Sand	.31	.40	.47
Gravel	2.75	2.41	2.12
	$6.55	$6.50	$6.46

In this case, mix No. 3—1-1.95-2.92 is the cheapest. The composition of this concrete would be as follows:

ONE CUBIC YARD

Cement	.121 cu. yd.
Sand	.280 cu. yd.
Gravel	.422 cu. yd.
Water	.177 cu. yd.
	1.000 cu. yd.

The mortar part of this mixture would occupy 0.578 cu. yd. and it is difficult to conceive of the gravel containing more void space than this would fill. For instance, if poor grading caused the voids in the gravel to run as high as 45%, the 0.422 cu. yd. of gravel particles needed for the batch could only carry 0.345 cu. yd. of void space, so that in this case it is clear that the concrete would be safe from non-uniformity due to variations in grading of the coarse aggregate. In this case there would be no advantage in the use of separated sizes of coarse aggregate.

The comparison in these two cases was based upon the assumption that the 5.25 gal. of water per bag of cement would produce a workable mixture in either case. As a matter of fact, if mix No. 7 had the proper workability, it is very probable that mix No. 3 could be made workable with a lesser amount of water, and some additional saving made in cement.

Conclusion

The possibility of combining several sizes of coarse aggregate at the batching plant is a construction method that should be taken into account in designing concrete mixtures for maximum economy. It is a useful tool, among several that the engineer should know how to use in producing uniformly good concrete.

An Ohio Producer's Comment on Mr. Crum's Paper

C. Gray (district manager, American Aggregates Corp., Indianapolis, Ind.) said in part: "Mr. Crum's paper has covered the subject 'The Use of Separated Sizes of Coarse Aggregates in Concrete Pavement Construction' very thoroughly from an engineering point of view. The engineering arguments used are sound and have been developed and proven by both laboratory and field research and experiences.

"There are, however, three distinct branches of the paving construction industry which are directly interested in any general change in coarse aggregate specifications and whose point of view would probably differ; namely, the engineer, the producer, and the contractor. Our first interest would be common in that we are all desirous of producing better and especially more uniform concrete where the additional cost is commensurate with the additional value or durability of the pavement.

THE paper by Mr. Crum brought out lengthy discussion by two operators, and while agreeing in the main with his contentions from an engineering standpoint, several practical objections were raised.

Effect on Production Costs

"The viewpoint of the engineer, who represents the downtrodden taxpayer, has been covered by very scientific and convincing engineering arguments. It appears to me, however, that as producers we are especially concerned with the effect such a specification would have upon our production costs. I cannot see where such a specification would add materially to our present investment in equipment. All of our present screen arrangements provide for the separation into the various sizes, but after such separation is made they are recombined in chutes before entering the loading bins. The only additional equipment cost would therefore be the expense of additional bins to accommodate the various sizes.

"The next phase to be considered is, in my opinion, the most important from our viewpoint. This is the question of an increase in waste materials. We all realize and have become reconciled to the fact that it is necessary to waste materials below 3/8-in. size. At least this is the case in the majority of deposits throughout the Middle West. It would take some rather convincing arguments, however, to convince a producer that there would be any economy in wasting any materials above 3/8-in. size.

"The present waste material, being below 3/8 in. in size, can be carried from the screens to the waste pile in flume-ways, which is a rather inexpensive method. The wasting of the larger sizes would call for more expensive methods, which when considered along with the reduced production and additional depletion of deposit, would result in a material increase in cost of production.

"As to whether or not the proposed specifications would result in the wasting of the larger sizes, that would be dependent upon flexibility of the specifications relative to proportions used in recombining. The necessity for flexibility is due to the fact that no set proportions of the two or more separate sizes of coarse aggregate could be determined for any plant which would not result in the plant producing an excess of one of the sizes when operating in different sections of the deposit. This excess would either have to be wasted or placed in storage awaiting a market, providing no market existed at the time of production.

"This waste could only be prevented by changing from the proportions required to produce maximum density to one which would absorb all excess material. The economy of such procedure would be dependent upon a comparison of the additional production cost in the first case with the cost of additional cement required in the second.

Effect of Depletion of Supply

"There is another feature that the engineer should not lose sight of when considering the economy of such a variation of proportions. That is the depletion of deposits from the standpoint of future sources of aggregate supply in addition to the standpoint of present economy.

"The highway construction industry is, in my opinion, still in its infancy. It is true that concrete pavements being constructed today are far superior both as to design and quality when compared with those constructed a few years ago. The fact still remains, however, that the so-called permanent highway only exists in the minds of the promoters of paving materials. Although our Indiana State Highway Commission law is only eleven years old, the state has already re-built concrete pavements constructed under it. It has also started to widen pavements out of the larger cities from 18 ft. to 40 ft. This will undoubtedly be continued until the main trunk lines are all at least 40 ft. wide, if not wider.

"It is therefore difficult to say as to whether or not there will ever be an end to paving construction. I am of the opinion, that in view of this fact, the day will come, at least in some localities, when considerable of the materials which we are now sending

to the waste pile, will be reclaimed and used in concrete construction. We should not lose sight of such a possibility when considering a specification which might require further wastage.

Service the Best Sales Argument

"Ability to give service is probably the most important and effective sales argument that the producer has, aside from price, in selling a contractor. We now experience, under normal conditions, difficulty in getting material to the contractor in the proper proportion of coarse and fine aggregate with only one gradation of coarse aggregate, even though it is loaded at the plant in the proper proportions and in ample time to reach the contractor when needed. It often happens that the train crew being unable to handle the entire shipment delivers an excess of one class of material, and a deficient amount of the other. This possibility would be increased in case another gradation was added.

Contractor's Viewpoint

"Now, let us consider the subject from the viewpoint of the contractor. Mr. Crum stated that such specifications would have only a very slight effect upon the bid price. But I am inclined to believe that such a specification would result in additional bins, weighing devices, and either additional cranes or cranes of greater material handling capacity. This opinion is supported by a number of contractors with whom I have discussed the subject. I can see where the use of a railroad crane as cited by Mr. Crum would not require any increase of this item, but such type cranes are not in general use and are not considered as practical as the caterpillar type. I am of the opinion that such a specification would result in serious delays to the contractor by failure to spot his cars in the proper proportion. This would be especially true in cases where the railroads were not in a position to give switching service more than once each day and where it was impossible to get adequate siding facilities.

Reduction of Maximum Size Advocated

"Going back to the engineering features, I doubt very much whether the efficiency of the present mixers is such that the resulting field concrete would benefit from the theoretical advantage of uniformity of gradation expected under such a specification. I do not believe that the materials would be recombined in the drum of the mixer in such a manner as to give any appreciable advantage over the present specifications in general use.

"I am of the opinion that just as satisfactory results could be established by reducing the top size of the coarse aggregate from 2½-in. size, which is the present practice, to 1½-in. Most gravel deposits are not very uniform as regards sizes, being made up of fine and coarse strata. For instance, one particular dry deposit in Michigan, with a bank 110 ft. high had extremely coarse material in the top one-third and extremely fine material in the bottom two-thirds.

"When the shovel was loading from the finer portion, we would experience difficulty in complying with the required minimum retention on the 1-in. screen, and when we caved the coarse stratum we would experience difficulty in staying under the upper limit. There was a difference of 40% between the upper and lower limits of the specifications. We finally changed the screens from a maximum opening of 2½-in. to 1¾-in., which corrected this condition. When we were in the coarser material that portion which was previously between 1¾-in. and 2½-in. was crushed down below 1¾-in. and resulted in additional crushed material rather uniformly graded from ¼-in. to 1¾-in. thus making the product compare more favorably with the coarse aggregate produced when in the finer portion of the bank.

IT was advocated by one producer that satisfactory results could be secured in highway work by reducing the top size of the coarse aggregate from 2 1/2 in. to 1 1/2 in. He also doubted the advisability of any state adopting a specification requiring separate sizes of coarse aggregate without first experimenting with available local materials.

"The closer the smallest permissible size is to the largest permissible size, within practical limits, the more uniform the product will be and the less possibility of segregation in handling, which in turn will be productive of a more uniform strength concrete with a constant cement content.

"In conclusion, I will say that I doubt the wisdom of any state adopting a specification requiring separated sizes of coarse aggregates without first confining it to special experimental projects."

Alexander Foster, Jr., (vice-president Warner Co., Philadelphia, Penn.), discussing Mr. Crum's paper, said, in part:

"In the design of concrete mixes for central mixing plants where laboratory conditions are approached, the economical proportions for a given strength depend upon grading in the sand and coarse aggregate. Minimum void content within the limits of good grading in the sand insures proper coating of all particles with cement paste and a minimum water requirement. Minimum void content in the coarse aggregate insures a minimum quantity of mortar to obtain workability. Hence, it is that well-graded materials are required to obtain minimum material costs.

"Conversely, if the cement and coarse aggregate contents of a concrete mix are specified as to proportions, well-graded fine and coarse aggregates having a low percentage of voids will produce higher strengths than will be obtained by the use of coarse aggregate with high voids. In the latter case, even though the same sand is used, it will be found that more sand is needed to fill the voids. This calls for more mortar and the cement-sand ratio changes, resulting in a weaker mortar and requiring more mixing water for a given workability.

Difficult to Prevent Segregation

"Well-graded gravels, having a low percentage of voids and ranging in size from ¼-in. round to 2-in. round, require special care in loading to prevent segregation. All the care in the world may be taken at the producing plant and segregation prevented, but upon delivery unloading may destroy the grading so that as the gravel enters the concrete mixer certain batches may contain gradings vastly different from the material as shipped.

"A great stride forward in obtaining constant grading from batch to batch at the mixer has been obtained by the separation of coarse aggregate into two or more sizes. Even with separation into two sizes some segregation may occur in the finer of two coarse aggregates. At the loading point less care need be exercised with the coarser material, but with the finer material special care should be taken.

New Jersey Goes to Separated Aggregates

"In 1930, the state of New Jersey required coarse aggregates for road work to be shipped in two sizes and that aggregates be weighed.

"Previously the requirements were for a coarser grade of gravel than found in the Tullytown-Morrisville district of Pennsylvania, which supplies a large proportion of coarse aggregate going into the roads in the southern half of New Jersey. Such a requirement meant the wasting of about 8 to 10% of the ½-in. sizes of gravel to insure the resulting gravel falling within the specification.

"At the Warner Co.'s plants in that district it was found that when crushing down to a 2-in. maximum size the gravel from ¼-in. to 2-in. fell within the 1930 Jersey specifications, whereas previously the accumulation of so-called pea gravel was a serious consideration. Here, therefore, was an outlet for a product for which there had been a limited market.

"Stone quarries have a very good market for stone chips and sizes from about 5/16-in. down. It is very hard during good times for some quarries to produce a graded material having the percentage of fines required by New Jersey. The specifications for the two sizes of coarse aggregates mak-

ing up the New Jersey road specifications are as follows:

% passing	1½-in. stripped	¾-in. N.J. specifications
2 -in.	100	
1½-in.	.....	100
1¼-in.	0-35	90-100
¾-in.	0-10	45-75
½-in.	0-5	15-45
¼-in.	0-2	0-5

"If the 1½-in. stripped aggregate is crushed stone, then the finer graded coarse aggregate can be gravel. Such an arrangement is to the satisfaction of both the stone and gravel producer.

Typical Market Requirements

"The Warner Co. supplies a great percentage of the gravel for concrete roads in the southern half of New Jersey. In Pennsylvania, by reason of the vast number of stone quarries spotted over the state, very little gravel is shipped on road work. Delaware does not permit gravel in its state roads.

"The largest market for sand and gravel is Philadelphia, with Wilmington and Trenton also good. At Philadelphia large central-mix concrete plants are located, with a smaller plant at Wilmington and one under construction to serve the Trenton district.

"The 1930 New Jersey gravel specification requires, with our general grading, a simultaneous production of about 40% stripped 1½-in., 57% of Jersey ¾-in., and 3% pea, or ⅝-in. gravel, for which a market can be obtained. A procedure which makes up for the deficiency in the 1½-in. stripped gravel is the simultaneous production of about 10% of 1½-in. stripped, 46% graded, 1½-in. commercial, 41% of ¾-in. commercial and 3% pea gravel.

Average Plant Run of Sizes at Two Plants

"The Warner Co. has two main inland or bank plants, one on the river known as the Manor plant and one on the New York division of the Pennsylvania railroad known as the Van Sciver plant. At each of these plants the grading of the gravel after crushing is about the same, as follows:

Passing 2 -in. ring..... 100%
Passing 1¼-in. ring.....74.5%
Passing ¾-in. ring.....41.7%
Passing ½-in. ring.....24.4%
Passing ¼-in. ring.....4.24%

"We have endeavored to keep the Philadelphia requirements in line with Jersey specifications, but with both 1½-in. and ¾-in. gradings, we have about reached the limit of the amount of fines allowed.

Satisfied That New Jersey Highway Requirements Give Better Operation

"The Warner Co.'s experience with the sand and gravel business in recent years indicates a tightening of specifications on all sides. Materials have to be cleaner and grading requirements are much more strict than formerly. To supply better graded materials certain changes were necessary, and a few extra changes were required to obtain materials to suit the New Jersey Highway Department. These changes enabled us to produce almost any combination of materials that might be required. For these reasons and because the finer sizes of gravel have an assured market, we have found to date that the shipment of two sizes gives us better production conditions and the consumer the ability to produce more uniform concrete.

"From the standpoint of a retailer with yards in metropolitan districts where land values are high, the handling of gravel in multiple sizes is a serious consideration. Where concrete plants are located working on the most economical mixes to produce given strength and where belt conveyors to concrete plants and truck bins are used, it may prove more economical to take gravel for immediate delivery in one or at most two sizes, and make the separation over the concrete plant or truck bins.

"Graded gravel taken from stockpiles shows some segregation and is always dirty. The use of vibrating screens over bins gives a regrading and makes washing possible."

WHAT is a deleterious substance from the standpoint of producing good concrete? This was a question which was brought out by F. C. Lang of the Minnesota Highway Department and which seems to lack a specific definition. He considers that we still have insufficient data to answer this question definitely.

Deleterious Substances

F. C. Lang, engineer of inspection and tests, Minnesota Highway Department, read a paper on "Deleterious Substances in Concrete Aggregate," which laid particular emphasis on the lack of a specific definition or a specific test of a deleterious substance. He said it was a favorite term with specification writers and yet the determination of this specification was almost invariably left with the local engineer with very little available in the way of a satisfactory test to guide him. Various stages of the soundness or flatness in particles make them deleterious, according to one's interpretation of specifications, but the final determination depends largely on individual judgment.

Mr. Lang said that some progress had been made, and quoted the A. S. T. M. definition for deleterious substances, that they must not total over 5% by weight.

Some of the things that must be determined are: What is a soft particle? How free from inherent coating must a particle be? What determines the quality of gravel pebbles? Mr. Lang said that specifications for the quality of gravel were based largely on crushed stone specifications and that little or no real research work had been done to allow for the fundamental differences in the characteristics of the aggregates themselves.

He described at some length the various tests for soundness, which are more or less familiar to all producers, mentioning particularly the sodium sulphate test. He said that not sufficient data had been accumulated to make it of very much value and that the problem was difficult because gravel pebbles consist of a miscellaneous collection of rocks.

The sodium sulphate test has shown, however, that gravels having a considerable volume change and those structurally weak did show up, and that in those having a considerable volume change, chert was the most objectionable. All particles that decrease the strength of concrete in place should be determined, but even then it is a matter of relativity, since it depends somewhat on the use to which the concrete is to be put. His entire paper was more in the line of an argument for more complete test data and the determination and definition of deleterious substances than anything else.

Association Affairs

William M. Kinney, vice-president and general manager, Portland Cement Association, Chicago, Ill., very thoroughly discussed trade associations as an institution in a paper under the title, "The Trade Association—A Business Asset," which we give practically in full:

The Trade Association—A Business Asset

It may be that some who are here in the room have considered it one of the penalties of membership to sit two or three times a year and listen to a broadcast from outside your industry on the happy, or perhaps the sombre, aspects of the sand and gravel business. With this probability in mind, I have decided to mention sand and gravel quite incidentally and to confine my remarks to a few of the paramount problems which confront your industry as well as that of manufacturing cement.

We are privileged to live in an era in which men recognize the advantages of co-operative action in matters affecting their common welfare. The trade association is an evidence of this recognition. Manufacturers of a given commodity, each with an individual sphere of influence and none with a nation-wide viewpoint, easily find the protection and development of their markets can best be undertaken by collective action.

This latter thought embraces the commonly stated and most important purpose of the trade association. To reach the heights of accomplishment expected of it,

the association must be made the real generative force back of the industry it is designed to serve. It must be grounded on facts. It must throw guesswork into the discard and to do so it must develop strong research and investigative functions, both technical and economic. Although at times these may appear far removed from ultimate objectives, they are vital.

The Portland Cement Association proceeds upon the assumption that facts about the material it is promoting lead to clearer understanding by the users and consequently more economical and, therefore, more general use. Facts about the product pave the way for effective promotion and are particularly valuable for the education and confidence which they impart to the men who make contact with the buyers.

Research a Basic Function

Research should be regarded as the basic activity of any trade association. It costs money and requires time to develop the fundamental facts about a product and its uses; well-directed research, however, not only pays well, but it almost guarantees the success and perpetuity of promotion efforts built upon it.

But research is of limited value to the members of an organization such as yours unless ample facilities are available for the dissemination of the information developed. The necessity is obvious for an organization of sufficient size and character to impress arguments on the very large group of buyers and as occasion arises to conduct successful defense. Bulletins and periodicals are also necessary to carry information farther than it can be taken by personal contacts and to permit retention of the contents for recurrent use. Provision must be made for adequate and repeated distribution of printed matter. Educational work should be undertaken through the media of technical societies, short courses held locally and a well equipped bureau of information. Cooperation must be extended to institutions of learning in the preparation of a coming generation of users.

Mass methods must be employed to reach the enormous group of present and future users effectively. Personal contacts are effective but necessarily limited by cost and, therefore, reserved for important cases. Relatively few associations for trade extension are financed sufficiently to permit either adequate personal contact or the conservative use of mass methods, without either of which it is hardly possible to produce results that are fully satisfactory.

Technical Problems of Production and Operation

The active trade association also finds opportunities for important work in fields not directly connected with market development. There are technical problems relating to production, handling and delivery methods; statistical work by which progress of one kind or another is measured; studies in the field of transportation, insurance, cost accounting or other matters of common concern. All of these, however, are to be viewed as subsidiary activities, the main objective properly being that of creating new and expanding present markets for the products.

So far as you have permitted it to go, your association has done a splendid job and one which demonstrates its fitness to undertake a more extended program. Its personnel consists of men who impress others with their preparation, sincerity and ability. The range of work undertaken seems sensible. Technical activities are well grounded and ably administered, although an even more extended program along these lines would seem highly advisable. Correspondence is transacted promptly and intelligently. The printed matter is dignified and respect-

SOME of the present functions as well as future possibilities of trade association activities were brought out by Wm. M. Kinney, vice-president and general manager of the Portland Cement Association. He said, among other things, that the sand and gravel producers have a legitimate claim on a large proportion of the business for which concrete is best fitted but which is given to other materials.

commanding. But it does not seem to me that sufficient provision has been made for work aiming directly at the problem of increasing your volume of shipments. As a group you do not seem to be fully capitalizing your promotion opportunities, and with no desire to urge greater action than experience would show to be conservatively beneficial, I would like to direct your interest briefly to this subject.

In the field of concrete alone an enormous amount of educational and promotion work remains to be done. Sand and gravel producers have a legitimate claim on a large proportion of the business for which concrete is best fitted but which is going to other materials. Certainly a share of this business would not be distasteful to your membership. If you had but a portion of this work it would swell shipment volumes beyond anything in past experience.

The cement manufacturers are credited with having made considerable headway in promoting the uses of concrete. Yet they have been unable to completely cover the entire field and it is hardly logical to expect them, as the manufacturers of but one of the ingredients, to undertake single-handed the enormous task of everywhere putting over concrete, which usually means cement, sand and gravel or stone, as a sure-shot proposition. While it is obvious that an expansion of present efforts by the cement association would yield profitable returns, members might be justified in taking the position that they are now carrying more than their share; some doubt the wisdom of additional expenditures until evidence appears of a more equitable distribution of the load.

Sand and gravel requirements for concrete highway work are frequently valued at two-thirds as much as the cement. In building construction the factory value of the aggregate may exceed that of the cement. Since manufacturers of cement have found these promotive activities profitable, although unable to completely cover the market, it would seem almost conclusive that parallel activities by the sand and gravel industry would also produce good results. At present expenditures of your organization undoubtedly go largely for ground work; additional sums appropriated should bring relatively larger returns. Your work would correlate quite naturally with ours and would doubtless prove effective in many places we have been unable to reach.

Trade Extension

In trade extension work the manufacturer foots the bills and it is he who is best fitted to judge the adequacy of the return. The president of one of the largest member cement companies stated a few months ago, in discussing the work of the Portland Cement Association, in promoting streets and roads:

"The promotion of concrete pavements for streets and roads probably affords the most tangible example of an enormous new market created as a result of association work. Inspection of the contract awards for concrete pavement, year by year and state by state, shows the results obtained by district office promotion to be almost amazing. Before 1918 pavement awards were relatively small, though steadily increasing. In 1918 about 5,000,000 bbl. of cement were consumed in pavement construction. Only 10 years later, the cement used in roads and streets amounted to nearly 50,000,000 bbl., an increase of almost 1000%. The shipments of cement for concrete paving work alone during the past 10 years amount to 290,000,000 bbl., more than four times the entire output of portland cement for all purposes during the year of 1918.

"Credit for developing this particular use must be given to the association. It is true that the period has been one favorable to this class of promotion, but the association may be credited for taking advantage of the opportunity. The entire expense of carrying on all association work for these 10 years was $25,000,000 in round figures. If all of this expense were charged against the additional 290,000,000 bbl. of cement shipped for paving, the cost of promoting this business would amount to only 8.6 c. per bbl. On that basis, whatever else the association did during those years we got free."

In order to keep within reasonable time limitations, let me rely upon this single

illustration of the practical worthwhileness of market development.

Market Building

The need for building up old markets and creating new ones is perpetual. The permanent success of the sand and gravel business, like that of the cement business, must depend upon a continuous program of development work. It cannot be expected that after pushing the proposition for a time it will continue by perpetual motion.

Sand and gravel, like cement, are commodities which don't wear out. When used in concrete, the product requires few repairs. Consequently yours is a problem of forever discovering new uses for your materials and of finding new ways for getting more business out of the older uses. Competition with other products, old and new, is always on your trail.

If I appear over-enthused with the prospects for your organization in the promotion field, it is because I realize fully the potential markets for sand and gravel are vastly greater than present facilities for developing them. Then I know that you have need to be greatly concerned with the fact that the present shipping capacity in your industry is far in excess of current demands. The only apparent way out is by means of intensive development; no other effective remedy has been or seems likely to be found. Develop your markets cooperatively through your association; to intensify individual selling efforts would only tend to redistribute the present volume of business rather than increase it.

The ancient Roman or Greek who had a message for the people could only communicate successfully with a gathering small enough to assemble within reach of his voice. Writings were of little effect because few people could read. But today with the possibilities of well-prepared booklets and literature, the daily press and the professional journals, the radio and the facility with which men multiply their effectiveness by rapid travel, it is an easy matter to circulate the truth. And it is an easy matter to keep reimpressing it, through the many available channels, until it is established. Franklin, once speaking of the improvement in facilities for communicating constructive information, observed that "it is not only right to strike while the iron is hot, but it may be very practicable to heat it for repeated striking."

Gentlemen, if that line of logic is sound—and in my own mind I am convinced that it is—then you owe it to your industry, your own businesses and yourselves to vitalize still more the activities of your association. I have made no attempt to suggest details of procedure because for me to do so would be presumptious and would encroach upon the perogratives of your able and active executive committee. Prepare a program broad enough to insure accomplishment and you will find ahead of you an era of greater prosperity, happier business relations and constantly expanding opportunities.

John Burroughs, the great naturalist, once said, "Men may stagnate as truly as water may stagnate, and just as motion and direction are the remedy for one, so are purpose and activity the remedy for the other."

Some High Spots in the N. S. and G. A. Secretary's Report

V. P. Ahearn's report as executive secretary of the association contained an excellent resumé of the work of the association during the past year, mentioning particularly the census of the sand and gravel industry which was initiated by the association, which we have already referred to, and the progress of the committee on trade relations, under the chairmanship of Hugh Haddow, Jr.

THE report of Secretary Ahearn was much more than a perfunctory document. It presented a graphic picture of the organized activities of the sand and gravel industry and their overlappings with the activities of other agencies. He felt that it is safe to anticipate a better year in 1931 than in 1930 although he did not expect a boom period or a quick return to normal.

In view of the current interest in trade practice codes, trade practice conferences, etc., what Mr. Ahearn had to say is particularly interesting: "While it (the committee) is still convinced that it would be extremely beneficial to the sand and gravel industry to formulate a code of ethical practices, it reported to the board of directors at the midyear meeting that there had been some political developments which made it advisable to withhold, temporarily at least, petitioning the Federal Trade Commission to hold a trade practice conference of the sand and gravel industry. Pending the time that a final decision in this regard can be reached, our committee on trade relations will proceed with its work of preparing a list of unfair and unethical practices in the sand and gravel industry, with a view to having it adopted in a code of ethics for the business if a trade practice conference is not held; or as the basis of such a conference if, in the discretion of the committee, it becomes desirable to carry out the original plan of having a formal trade practice conference under the jurisdiction of the Federal Trade Commission."

Sand and Gravel Safety Contest

Referring to the safety contest inaugurated in the sand and gravel industry in 1929, Mr. Ahearn said: "The safety contest among members of the National Sand and Gravel Association, conducted under the supervision of the United States Bureau of Mines, was continued in 1930. Two trophies provided by Rock Products were awarded last year and certificates of merit were also awarded to the plants which made excellent showings in the contest but which did not win the trophy because other plants with equally as good records reported larger man-hour operations."

In 1929, 26 plants entered the contest, but, due to intensive efforts, more than 80 plants participated in the 1930 contest, the winners of which have not yet been determined by the Bureau of Mines. Mr. Ahearn said: "The safety contests are the best means for securing information which can be used in bringing about a proper adjustment of workmen's compensation insurance rates in the sand and gravel industry throughout the country."

Credit Bureaus

Other subjects discussed in his report were credit information, which, in view of the efforts being made by credit bureaus throughout the country, promoted by general contractors, is of particular significance. Mr. Ahearn said: "It would seem to us a mistake to introduce into the operation of credit bureaus any activity which constitutes even the slightest departure from the underlying principle: exchange of credit information. If the bureau is confined to this important work, there can be no question as to its legality. If, however, it goes beyond that province, if it undertakes to circulate blacklists of any description or character, and if it is used as a subterfuge for the accumulation of large sums of money which might be used for purposes which would not bear the scrutiny of the constituted authorities, then it should be rejected by the sand and gravel industry.

"The control of credit bureaus should rest in the hands of those who provide the funds for their operation. They alone should decide upon policies, but naturally they should consult with their customers before reaching a decision on any controversial question. The producers of concrete aggregates, it must be admitted, are far behind the rest of American industry in the matter of exchange of credit information."

It will be remembered that the numerous credit bureaus established more or less under the auspices of the Associated General Contractors in various localities have given the material men only a minority part in the control and yet have asked the material men to contribute as much as 5c per ton of material produced to take care of the bureaus' financing.

On the Outlook

Regarding the outlook for 1931, Mr. Ahearn said: "It would be unwise to expect that 1931 is going to produce an exact reversal of business conditions. That it is going to be better is safe to anticipate, but how much no one knows. We shall not have a boom period or a quick return to normal, and the prospects point rather to a gradual improvement, with, perhaps, tempo-

CONVENTION CELEBRITIES
SKETHED FROM LIFE
CAN YOU NAME THEM?

rary reversals. But the trying period through which we have passed has not been an unmitigated evil. It has compelled us to take an inventory of our activities, to increase the efficiency of our business, to introduce needed economies, and to spend our money only for those things which are productive of results."

The concluding remarks in Mr. Ahearn's report are particularly potent:

"The National Sand and Gravel Association represents an industry with a limited shipping radius, but this does not diminish in any degree the need for an active national organization of the business. In the modern scheme of things, no business is strictly local. Sand and gravel producers, if they ship only a few miles from their plants, are influenced, as one example, by the decisions of engineers who are guided in the preparation of specifications by information furnished to them through their national engineering societies. The American Society for Testing Materials is the source of authority on specifications and methods of tests for aggregates, if we may be permitted to cite them as an illustration. That organization recognizes the competency of the National Sand and Gravel Association to express an opinion regarding the proper use of sand and gravel, and that opinion is based on information which only a national organization of our industry could gather.

"The association is engaged in the production of a useful and indispensable service for the sand and gravel industry. The nature of the work is such that it could not be undertaken by the individual producers, for the reason, in the first place, that the cost would be prohibitive, and, for the second reason, that as individuals, speaking only for themselves and bound by the limitations which such a status would impose, their voices would lack the necessary weight in dealing with the bodies which now extend official recognition to the National Sand and Gravel Association.

"There is logic in the reasoning that complete demoralization would result from a discontinuance or a major curtailment of the work of the association. The evidence is complete that membership in an aggressive national trade association is accepted by the public as a demonstration of responsible and intelligent business management, and it is with the confidence that membership dues are a good investment that we ask the support and co-operation of those engaged in the industry."

St. Louis District Office

In view of the fact that the St. Louis territory was the first to be organized as a district of the National Sand and Gravel Association, its work and accomplishments during part of its first year is particularly interesting and significant. **D. D. McGuire,** district engineer, National Sand and Gravel Association, St. Louis, Mo., gave the following report of his activities:

"The results of the activities of the St. Louis District Office are quite like those of the National Association in that a good many of the accomplishments are of an intangible nature and cannot be specified in detail. The promotion of a feeling of mutual respect between the engineers and the producers cannot be computed in dollars and cents except relatively and over a period of several years. The many factors which contribute to business conditions point favorably towards any effort expended. This report is intended to show the major projects which were attacked during the 1930 season and the means for increasing that feeling which means so much to the satisfactory sale of a product.

"Probably the most important activity in keeping the sand and gravel industry before the engineers and architects in this district is the publication of the *Sand and Gravel News*. This is a four-page bulletin published monthly on good stock and contains articles of local interest and of engineering value. Five issues of the *Sand and Gravel News* have been sent out and the reaction from the mailing list is flattering.

THE National Sand and Gravel Association has one district office, established in the St. Louis territory and a report of which was presented. This report not only gave a presentation of the activities of this particular office but tended to show to the members the kind of work which such an office can accomplish.

"A second publication called the *District Bulletin* is sent weekly to each of the member companies and contains material of a confidential nature. This bulletin details the weekly activities of the district office, lists the visitors and the contacts by calls, details the travel and reports on results, discusses specifications and plant practice when such material is available. Contracts advertised and awarded are listed in the weekly bulletin and abstracted from a general list to a list applicable to this district.

"A rather large map is kept in the district office and is available to those interested. This map contains keyed information as to types of aggregates used in local construction and is supported by a card file of information cross-filed and signaled to indicate the details of the various contracts.

Uniform Specifications Promoted

"The biggest problem which confronted the district office in the 1930 season was the confusion of specifications in force in this district. A survey showed eight different specifications for coarse aggregate for roads and streets within the shipping area of St. Louis. Such a condition required excessive facilities in the plants and a great variety of materials stocked separately in the material yards. It was realized that this market condition must be clarified before accuracy in meeting any specification could be anticipated by the producers.

"A meeting of the local engineers and architects who were responsible for the specifications was called on August 20 at the Jefferson Hotel. The problem of specification confusion was presented to this group and a small fact-finding sub-committee was appointed to investigate the specification conditions, the possibilities of production, and the requirements for good concrete aggregates. On November 4 this committee completed its work and reported its findings to the entire committee of engineers and architects. After considerable discussion the proposed specifications were adopted and it was agreed that these would be included as standard in the specifications for which this group was responsible.

Made Survey of Materials

"The work of compiling the proposed specification entailed considerable effort on the part of the committee and of the producers, for the matter was attacked from an engineering standpoint and after a rather thorough investigation of available materials. The producers had tests made at their respective plants which developed information about the materials pumped from the river. Samples were taken twice a day from each plant for ten consecutive working days. These samples were complete cross-sections of average material on the belt between the river hopper and the head house of the plant. The material thus sampled was washed out over a 4-mesh screen and the retained material analyzed with square mesh screens. During the ten-day test period material was dredged from all available deposits within the limits of production and a quite satisfactory cross-section of material available for each plant was obtained by this test procedure. When the results were tabulated they developed information interesting both to the committee and to the producers.

"After investigating the materials available the committee made an exhaustive study of the literature affecting the gradation of coarse aggregate and of specifications in force in this locality. By conferring with the architects interested in small-size aggregates for reinforced concrete construction, engineers interested in paving and highway construction and with the data tabulated from the research mentioned before, it was possible to draw the specification which was proposed and adopted by the entire group.

"This specification means that the gravel companies in this district need not manufacture more than two sizes of aggregates for road and street construction. One of these types is for use by the Missouri State Highway Department and conforms to the requirements of the general specification ex-

cept that material in excess of 1½-in. square mesh sieve is retained in the plant for inclusion in shipments for other destinations. There is a deficiency of material in the river which passes a 2-in. square screen and is retained on a 1½-in. square screen. Material rejected for use in the Missouri State Highway Department assists in the manufacture of aggregates for other destinations.

"The bulk of the material produced in this district is sold in the municipalities within the limits of St. Louis county. This entire group has subscribed to the new specification known as Grade A, and practically all material yards from which coarse aggregate is trucked need only stock this size of gravel for road and street construction. Two other types of gravel, one with a 1-in. top size and the other with a ¾-in. top size, have been adopted for building construction. There is a considerable sale for aggregates whose top size is ⅜ in. These four coarse aggregates are all the types necessary to be carried in stock at any of the material yards.

"Each of the coarse aggregates mentioned above has been given a letter to identify its grade. These identifications have been broadcast through the medium of the *Sand and Gravel News* such that aggregate types are now simplified for the sales organization and rejections due to a misunderstanding of type of aggregate are obviated.

"The specifications have been built up on the basis of splitting the total coarse aggregate on such screens that they may be recombined in the plant to meet the standard requirements or may be shipped separately for recombining at destination. Engineers do not seem to be agreed at the present time as to the most advisable point for recombining increments of size, and it was thought advisable in working out this specification to plan for recombining either at the plant or at destination.

Need Broader Application of Simplified Specifications

"This work of simplifying specifications is in line with a national movement and finds application any place where sand and gravel is produced. Problems of this nature appear in plants along the Ohio river where materials are produced for use in two or more states as well as adjacent cities and counties. Aggregates destined for similar use need not be produced under different grading requirements if the producer presents his problem to the engineer. Producers are to blame for lack of consideration of production difficulties because they have failed to present their problems in a concerted manner and support their requests with engineering data. The National Sand and Gravel Association has been practically the only agency supporting this movement, but its efforts must be national in scope. A local branch of the National Association has every advantage in obtaining more rapid results where effort may be concentrated.

Specific Projects

"Among the other problems attacked during the 1930 season by the district office were such as: The promotion of gravel for use in elevators containing 30,000 cu. yd. of concrete subjected to possible heat from burning grain and built by the Missouri Pacific railroad. A material survey for local sand and gravel for a 14-mile Missouri state highway project. The investigation of requirements for Mississippi river sand as a filler for asphalt to be used by the city of St. Louis. The investigation of the results of Mississippi river sand when used in concrete designed by the mortar-void theory in force in the Illinois Highway Department. The use of sand versus limestone screenings as a cushion for granite blocks.

"The specification situation in this district has been quite satisfactorily clarified, but the problem remains for the coming year's work to promote the idea of this specification to those few users who have not yet indicated their willingness to subscribe. It is expected that this will be accomplished by continual visits to the construction projects in this area and by routine calls on the engineers and architects who supervise the construction. It is also planned to further assist the local producers by arranging the programs of construction such that the volume of work may be anticipated. It is expected that this may be arranged in the form of a map on which is plotted railroad freight rates to the destination of each contract. Material surveys will further inform the producers of competitive markets and may develop information for new sources of production.

THE harmony existing in the National Sand and Gravel Assoiation, and the confidence of the membership that the work of the year has been carried on efficiently, were expressed in the re-election of the same officers who served during 1930.

"Numerous other details of contact between the producers and engineers will come up as the construction season proceeds, and each must be handled in its own way. The fact that the district office exists permits of a solution of such problems from an engineering standpoint and courts an understanding between the producer and the user. Most of the differences between the man who uses and the man who produces are brought about by their inability to speak the same language or to understand the other's problems. If this office can form a clearing house whereby this understanding may be clarified, then the results will be automatic and we will consider that we have done a good job."

Officers Elected

The present officers of the association, Robert J. Potts, of the Potts-Moore Sand and Gravel Co., Waco, Tex., was re-elected president; Harold V. Owens, of the Eastern Rock Products, Inc., Utica, N. Y., was re-elected vice-president; Harry S. Davison, of J. K. Davison and Bro., Pittsburgh, Penn., was re-elected secretary-treasurer, and Alexander Foster, Jr., of the Warner Co., Philadelphia, Penn., and Frank W. Peck, of the Peck-Thompson Sand Co., Kansas City, Mo., were re-elected members of the executive committee, in addition to Paul P. Bird, president of the Boston Sand and Gravel Co., Boston, Mass., who succeeded H. N. Battjes, vice-president of the Grand Rapids Gravel Co., Grand Rapids, Mich.

Edwin H. Conrades, president of the St. Louis Material and Supply Co., St. Louis, and C. B. Ireland, vice-president of the Montgomery Gravel Co., Montgomery, Ala., were elected members of the board of directors, succeeding H. N. Battjes, of Grand Rapids, and V. A. Cordes, of the Wolf River Sand and Gravel Co., Memphis, Tenn. The other members of the board of directors who were re-elected are: Paul P. Bird, Boston, Mass.; J. C. Buckbee, Chicago, Ill.; F. D. Coppock, Greenville, Ohio; H. M. Davison, Milwaukee, Wis.; R. C. Fletcher, Des Moines, Iowa; Alexander Foster, Jr., Philadelphia, Penn.; M. B. Garber, Lorain, Ohio; W. H. Gemmer, Houston, Tex.; D. Hyman, Buffalo, N. Y.; Paul F. Jahncke, New Orleans, La.; V. O. Johnston, Lincoln, Ill.; W. H. Klein, Chattanooga, Tenn.; C. F. Mullen, Columbus, Ga.; M. A. Neville, Lafayette, Ind.; F. W. Peck, Kansas City, Mo.; John Prince, Kansas City, Mo.; F. W. Renwick, Chicago, Ill.; J. L. Richmond, Huntington, W. Va.; Phil K. Rodgers, Pittsburgh, Penn.; J. M. Settle, Louisville, Ky.; J. L. Shiely, St. Paul, Minn.; H. E. West, Muskogee, Okla.

The local convention committee, consisting of C. G. Besch, of the Standard Building Material Co., St. Louis; O. S. Conrades, of the St. Louis Material and Supply Co., and George Ratermann, of the Central Building Materials Co., St. Louis, provided most unusual and entertaining features of the convention.

Resolutions

The association adopted, or perhaps more accurately endorsed, the same resolution adopted by the National Crushed Stone Association the week before, relative to President Hoover's recommendation for a Congressional investigation of the working of the Federal anti-trust laws. This resolution will be found on page 65 of this issue in the report of the National Crushed Stone Association convention. The National Sand and Gravel Association also adopted a very similar resolution to that adopted by the

National Crushed Stone Association commending the work of the United States Bureau of Mines in behalf of the nonmetallic mineral industries.

In addition to these resolutions there were also the customary ones commending the local committee for its work and also one expressing condolence to the widow of the late J. E. Carroll, of Buffalo, N. Y., who was one of the founder members of the association and for a long time one of its most prominent members. Mr. Carroll's death occurred last November, but was not generally known until this convention.

REGISTRATION

Producers

Allen Gravel Co.—R. S. Smith. Memphis, Tenn.
American Aggregates Corp.—C. Gray, Indianapolis, Ind.; Paul S. Klyne, Columbus, Ohio.
Amory Sand and Gravel Co.—E. L. Puckett, O. C. Thomas, Amory, Miss.
Arkansas City Sand and Gravel Co.—N. C. Dunn, Arkansas City, Kan.
Arkansas River Sand Co.—W. E. Rogers, Tulsa, Okla.
Arrow Head Sand and Gravel Co.—F. A. Horn, St. Louis, Mo.
Arrow Sand and Gravel Co.—S. Stepanian, Columbus, Ohio.
Bedford-Nugent Co.—J. W. Bedford, Fred Theiman, Evanville, Ind.
Bellevue Sand and Gravel Co.—A. C. Schneider, Bellevue, Iowa.
Blue Valley Gravel Sand Co.—C. A. Steele, R. B. Steele, Charles Steele, Fairbury, Neb.
Boston Sand and Gravel Co.—Paul P. Bird, Boston, Mass.
Builders Material Co.—S. P. Moore, Cedar Rapids, Iowa.
Buffalo Gravel Corp.—R. W. Eberly, D. Hyman, Buffalo, N. Y.
Buffalo Slag Co.—H. W. Vickery, Carlton S. Wicker, Buffalo, N. Y.
Central Building Material Co.—W. L. Woolsey, Glencoe, Mo.; W. H. LaBee, Sherman, Mo.; W. J. Hartenbach, T. N. Hayden, Bernard J. Huges, J. B. Key, Al. Ratermann, Geo. Ratermann, A. H. Severs, L. J. Siesener, St. Louis, Mo.
Central Sand and Gravel Co.—W. E. McCourt, Memphis, Tenn.
Cincinnati Builders Supply Co.—Julius J. Warner, Cincinnati, Ohio.
Concrete Material Corp.—F. W. Wright, Waterloo, Iowa.
H. D. Conkey and Co.—O. J. Ellingen, Mendota, Ill.
Consolidated Sand and Gravel Co.—A. G. Bennett, Toronto, Ont.
Construction Material Corp.—R. C. Yeoman, Chicago, Ill.
Consumers Sand Co.—A. H. Kaepke, Harold N. Richardson, Topeka, Kan.
Coon River Sand Co.—C. V. Raip, Des Moines, Iowa.
Cross Country Gravel Co.—H. L. Dickinson, Benton, Ark.
J. A. Daly Osage Sand Co.—L. A. Daly, Nevada, Mo.
J. K. Davidson and Bro.—H. S. Davidson, H. H. Stewart, Pittsburgh, Penn.
Delaware Sand and Gravel Co.—F. V. Heistand, Muncie, Ind.
Des Moines Co-Op Sand Co.—Roy Weir, Des Moines, Iowa.
Des Moines Sand and Fuel Co.—E. M. Gray, Des Moines, Iowa.
Dresser Sand Co.—E. C. Dresser, Leavenworth, Kan.
Eastern Rock Products, Inc.—W. D. Dodge, Latham B. Gray, H. V. Owens, Utica, N. Y.
Estill Springs Sand and Gravel Co.—Larry G. Banner, Estill Springs, Tenn.
Flint Crushed Gravel Co.—R. C. Fletcher, Des Moines, Iowa.
Fort Worth Sand and Gravel Co.—M. E. Hart, Ft. Worth, Tex.
General Concrete Products Corp.—F. J. Haggerty, Warren, Penn.
General Material Co.—A. C. Butterworth, Karl W. Lick, Paul Thomson, H. F. Thomson, St. Louis, Mo.
Gifford-Hill Co., Inc.—F. R. Gifford, J. Rutledge Hill, Dallas, Tex.; L. E. Reel, Forest Hill, La.
Glasgow Sand Co.—A. E. Fisher, Glasgow, Mo.
Grand Rapids Gravel Co.—Dewey D. Battjes, Henry N. Battjes, Grand Rapids, Mich.
Greenville Sand and Gravel Co.—Geo. W. Vinzant, Greenville, Miss.
Halliday Sand Co.—H. H. Halliday, Cairo, Ill.
Hamilton Washed Sand and Gravel Co.—H. G. Ferris, S. E. Sharp, Warsaw, Ill.
Hart Gravel Co.—Don Rex Hart, Sandborn, Ind.
Hartland Washed Sand and Gravel Co.—J. E. Palmer, Hartland, Wis.
Hawkeye Cooperative Sand and Gravel Co.—Joe Keefner, John Keefner, Des Moines, Iowa.
Hawkeye Material Co.—G. P. Thomas, Iowa City, Iowa.
Hersey Gravel Co.—W. H. Allswede, Hersey, Mich.
Holloway Gravel Co.—H. H. Holloway, Amite, La.
Ideal Sand and Gravel Co.—Grant McGowan, Wayne A. McGowan, C. E. Thomas, Mason City, Iowa.
Interstate Sand and Gravel Co.—H. L. McGurk, Terre Haute, Ind.
Jane Sand and Gravel Co.—W. D. Tulley, St. Louis, Mo.
Joliet Gravel Co.—John Sankey, Springfield, Ill.; R. J. Stone, Joliet, Ill.
Kansas Sand Co.—Fred J. Kuehne, Otto Kuehne, Jr., Topeka, Kan.
Keystone Sand and Supply Co.—W. A. Bliss, Pittsburgh, Penn.
Koenig Coal and Supply Co.—Glen W. Waite, Detroit, Mich.
Landers - Morrison - Christenson Co.—Chas. H. Young, Minneapolis, Minn.
Lawrence Sand Gravel Co.—Clyde Browning, St. Louis, Mo.; F. H. Gades, Lawrence, Kan.
Lawson Coal and Sand Co.—O. A. Lawson, Hannibal, Mo.
Lawson Sand and Gravel Co.—C. C. Shackelsworth, Lawrence, Kan.
Lawson Sand and Material Co.—E. B. Winkler, Kansas City, Mo.
Leonard Gravel Co.—F. P. Leonard, Howard C. Leonard, Lansing, Mich.
Lincoln Sand and Gravel Co.—H. D. Clouse, J. C. Johnson, V. O. Johnston, R. E. Weaver, Lincoln, Ill.
Makins Sand and Gravel Co.—T. C. Dayton, R. T. Eckert, C. H. Makins, Oklahoma City, Okla.
Malvern Gravel Co.—H. C. Baker, Malvern, Ark.
Material Service Corp.—Paul Ales, Irving Crown, Geo. M. Lenzie, Chicago, Ill.
McCrady-Rodgers Co.—Phil K. Rodgers, Pittsburgh, Penn.
McGrath Sand and Gravel Co.—C. L. Luker, Springfield, Ill.; T. E. McGrath, Lincoln, Ill.
Memphis Stone and Gravel Co.—W. H. McDonald, R. D. Smith, Memphis, Tenn.; W. M. Williamson, Paducah, Ky.
Menantico Sand and Gravel Co.—Hugh Haddow, Jr., Millville, N. J.
Merom Gravel Co.—Ben Stone, Indianapolis, Ind.
Michigan Gravel Co.—Ezra Sensibar, Saginaw, Mich.
Mississippi Lime and Material Co.—E. H. Milner, C. J. Myers, Clyde C. Schmoeller, Alton, Ill.
Mississippi River Sand and Material Co.—Michael Hendy, St. Louis, Mo.
Missouri River Sand and Gravel Co.—Harry E. Moore, H. E. Moore, Jr., G. W. Howell, Boonville, Mo.
Montgomery Gravel Co.—C. B. Ireland, Montgomery, Ala.
More Sand Co.—Roy More. Junction City, Kan.
Muskogee Sand and Gravel Corp.—N. B. Barling, Muskogee, Okla.; G. P. Hevenor, Rochester, N. Y.; Coy Johnson, Ft. Gibson, Okla.
Neal Gravel Co.—T. H. Hamilton, H. A. Hewel, W. E. Laughlin, H. E. Neal, F. P. Steinburg, E. Guy Sutton, Leslie Warnick, Mattoon, Ill.
Northern Gravel Co.—E. W. Boynton, James W. Cockerill, C. E. Graefner, Muscatine, Iowa; Frank Bingham, West Bend, Wis.
Oak Hill Gravel Co.—Geo. Guthrie, Springfield, Mo.
O'Donnell Sand and Gravel Co.—J. A. O'Donnell, L. D. O'Donnell, Vincennes, Ind.
Ohio River Sand Co.—H. P. Caldwell, J. M. Settle, Louisville, Ky.
Oil City Sand and Gravel Co.—Chas. A. Smith, Oil City, Penn.
Peck-Thompson Sand and Material Co.—F. W. Peck, Kansas City, Mo.
Pioneer Sand Co.—R. J. Stewart, St. Joseph, Mo.
Portsmouth Sand and Gravel Co.—F. C. Fuller, Chas. I. King, Portsmouth, Ohio.
Potts-Moore Gravel Co.—Robert J. Potts, Waco, Tex.
Putnam Sand Co.—E. W. Putnam, Salina, Kan.
R. J. Sand and Gravel Co.—H. J. Larkin, Rock Island, Ill.
Ray Sand and Gravel Co.—Gilbert Gilchrist, Charles H. Ray, Detroit, Mich.
Ray and Son—Earl Ray, Louisiana, Mo.
River Gravel Co.—Clyde W. Peterson, Flint, Mich.
River Sand Co.—O. W. Knight, Topeka, Kan.
River Sand and Gravel Co.—P. A. Yager, Owensboro, Ky.
Rock Island Sand and Gravel Co.—W. F. Herget, Rock Island, Ill.
St. Louis Material and Supply Co.—Elmer F. Brooks, Edwin H. Conrades, Otto S. Conrades, N. J. Eschenberg, F. J. Reinke, Joseph F. Weiss, St. Louis, Mo.
Saxet Sand and Gravel Co.—H. T. Brewster, Victoria, Tex.
Seaboard Sand and Gravel Corp.—Harold T. Smith, New York City.
Servicised Products Corp.—R. W. Ketchum, Chicago, Ill.
Shearer and Mayer Indiana Gravel Co.—Arthur G. Wilson, Indianapolis, Ind.
J. L. Shiely Co.—J. L. Shiely, St. Paul, Minn.
South Bend Sand and Gravel Co.—Herbert H. Hoffman, South Bend, Ind.
Southwest Sand and Gravel Co.—T. P. Russell, Dodge City, Kan.
Springfield-Pekin Sand and Gravel Co.—F. Stuart Kelly, Springfield, Ill.; Clarence L. Preston, Pekin, Ill.
Standard Building Material Co.—C. G. Besch, B. H. Boedeker, James P. Cahill, J. P. Clines, Harry J. Donovan, J. T. Duffy, Walter E. Gorg, Ed. W. Henne, W. N. Keeping, John D. McVey, H. F. Norcross, Chas. L. Power, W. O. Schmidt, E. M. Stevens, J. A. Ward, A. H. Yates, St. Louis, Mo.; F. Ortman, Sherman, Mo.
Stewart Sand Co.—Geo. H. Cook, G. W. Garrett, Fred Juedeman, W. E. Juedeman, R. H. Kelly, C. T. Marshall, Robert Mason, Felix McCarthy, G. O. McKay, John Prince, W. J. Stewart, Kansas City, Mo.
Sturm and Dillard Co.—J. H. Adams, Circleville, Ohio; J. H. Evans, Columbus, Ohio.
Terre Haute Gravel Co.—Wayne F. Nattkemper, Terre Haute, Ind.
Texas Construction Material Co.—T. J. Beesley, Phil Gemmer, W. H. Gemmer, Houston, Tex.
Texas Sand and Gravel Co.—N. C. Mickley, Waco, Tex.
Tulsa Sand Co.—G. E. Williamson, Tulsa, Okla.
Union Sand and Gravel Co.—J. L. Richmond, Huntington, W. Va.
United Materials Co.—B. S. Andrus, South St. Paul, Minn.
Utah Sand and Gravel Co.—L. D. Mortensen, Salt Lake City, Utah.
Van Camp Sand and Gravel Co.—H. A. Johnston, Gebanow, Ohio.
Vassar Sand and Gravel Co.—F. N. Anderson, Saginaw, Mich.
Warner Co.—R. C. Collins, Alexander Foster, Jr., Philadelphia, Penn.
Warsaw Gravel Co. and Central Construction Co.—Lloyd R. Radford, Warsaw, Ill.
West Sand Co.—H. E. West, Muskogee, Okla.
Western Indiana Gravel Co.—M. A. Neville, Lafayette, Ind.
Wolf River Sand and Gravel Co.—V. A. Cordes, W. L. Follett, Memphis, Tenn.
Yahola Sand and Gravel Co.—W. S. Dills, H. A. van Unwerth, Muskogee, Okla.

Others

Arkansas Highway Department—W. C. Ross, Little Rock, Ark.
Barnsdall Tripoli Co.—W. C. Bruce, St. Louis, Mo.
Byrnes Conway Co.—W. E. Howard, Cincinnati, Ohio.
George W. Camery—W. R. Spence, Hannibal, Mo.
Raymond E. Church Engineering Co.—R. E. Church, Cincinnati, Ohio.
"Concrete"—Norman W. Stineman, Chicago, Ill.
Herbert L. Conlin Co.—H. L. Conlin, S. J. McGrath, Toronto, Ont.
R. W. Crum, Highway Research Board, National Research Council, Washington, D. C.
Curtis and Burgess, Inc.—A. E. Curtis, St. Louis, Mo.
Dixoyl, Inc.—Chester Q. Dix, St. Louis, Mo.
M. E. Gillioz—Joseph J. Byers, Wheatland, Mo.
Hercules Cement Corp.—Herbert Coffman, Philadelphia, Penn.
William Houser, Inc.—Fred A. Bull, St. Louis, Mo.
Indiana State Highway Commission—H. E. Fillinger, Indianapolis, Ind.
Iowa Limestone Co.—J. A. Owens, Alden, Iowa.
Iowa State Highway Commission—Bert Myers, Ames, Iowa.
Lehigh Portland Cement Co.—H. B. Emerson, Chicago, Ill.
C. F. Lytle—R. N. Campsey, D. W. Clayton, Sioux City, Iowa.
E. L. Miller, 6214 Dardenelle Ave., St. Louis, Mo.
Minnesota Highway Department—F. C. Lang, Minneapolis, Minn.
Missouri Pacific Railroad—W. M. Weigel, St. Louis, Mo.
Missouri Portland Cement Co.—Geoff A. Saeger, St. Louis, Mo.; J. E. Wilkinson, Memphis, Tenn.
Missouri School of Mines—Joe B. Butler, E. E. Decker, Rolla, Mo.
Missouri State Highway Department—M. S. Lattimore, Macon, Mo.; V. B. Saville, Jefferson City, Mo.; H. A. Trowbridge, Sikeston, Mo.
M-K-T Railroad—C. R. Montgomery, St. Louis, Mo.
National Crushed Stone Association—J. R. Boyd, Washington, D. C.; W. F. Wise, Dallas, Tex.
National Sand and Gravel Association—V. P. Ahearn, C. E. Proudley, Stanton Walker, Washington, D. C.; D. D. McGuire, John McGuire, St. Louis, Mo.
Portland Cement Association—H. E. Frech, St. Louis, Mo.; William M. Kinney, Chicago, Ill.
Ready-Mixed Concrete Co.—J. E. Burke, Pittsburgh, Penn.
St. Louis City Hall—E. O. Aegerter, building commissioner; C. W. Barnes, Jr.; J. B. Clayton,

Jr.; George C. Gundlach, board of public service; Frank A. Hueser, deputy building commissioner; J. E. Power; V. H. Schroeder; H. T. Smutz; Mark R. Thompson; F. A. Winter.

Fred Schmitt R. and I. Co.—T. H. Fleming, Fred Schmitt, St. Louis, Mo.

Southern Coal, Coke and Mining Co.—W. K. Kavanaugh, St. Louis, Mo.

Southwest Stone Co.—W. F. Wise, Dallas, Tex.

Sunflower Sand and Gravel Association—C. M. Hise, Topeka, Kan.

Superior Mineral Co.—Oliver Rump, Potosi, Mo.

Tennessee Abrasive Co.—A. W. B. Carper, Louisville, Ky.

Texas Crushed Stone, Sand and Gravel Association—W. W. Carson, Jr., Austin, Tex.

Toronto Ready Mix Cement Co.—R. B. Young, Toronto, Ont.

Universal Atlas Cement Co.—C. A. Downing, J. W. Hussey, St. Louis, Mo.

University City, Mo., City Hall—Ben Gibbons, W. J. Hays, W. A. Heimbuecher, Clarence Kaiser, F. Kernan, J. W. Lapp, J. F. McDaniel, W. A. Preis, H. M. Prigge, E. R. Reuschel, Fred Wolffe.

Washington University—W. H. Wheeler, St. Louis, Mo.

Western Pennsylvania Sand and Gravel Association—Ray V. Warren, Pittsburgh, Penn.

Manufacturers' Exhibits

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.—Displayed panel photograph of style B Newhouse crusher; also a model of Texrope drive. On the first day of the convention this company took all interested producers to visit the General Material Co. plant where a 5-in. Newhouse crusher, 24-in. x 8-in. fine jaw crusher, 4- x 8-ft. triple-deck and 3- x 6-ft. double-deck vibrating screens were exhibited. Represented by Abe Goldberg, R. M. Schade, H. W. Schaub, Geo. W. Shores, and W. F. Taylor.

American Manganese Steel Co., Chicago Heights, Ill.—Displayed a working model of a Swintek ladder with Amsco chain. Also a model of 12-in. sand and gravel pump. An interesting part of this exhibit was a display that showed the bearings of the new type C pump. One mounting was with anti-friction bearings and a second with plain sleeve bearing. Also displayed photographs of equipment in use in sand and gravel plants. Represented by A. L. Blackmore, B. S. Carr, A. W. Daniels, Perry Nagle.

W. H. K. Bennett Co., Chicago, Ill.—Displayed a working model, one-tenth actual size, of a Diamond agitator and sand and gravel pump. Also photographs of installations. Represented by W. H. K. Bennett and J. W. Meckenstock.

Blaw-Knox Co., Pittsburgh, Penn.—Displayed several panels of photographs of agitator truck bodies, ready-mixed concrete plants and clam-shell buckets; also catalogs on complete line of equipment. Represented by J. V. Daniel, H. A. Camlin, and A. A. Levison.

Bucyrus-Erie Co., South Milwaukee, Wis.—Displayed several panels of photographs showing some of excavating equipment in operation in sand and gravel plants. Also conducted a guessing contest entitled "The N. S. & G. A. Better Business Booster." Those in attendance at the convention were given buttons with a number; the object was to find "old man booster," whose identity was unknown until after the convention was over. Three people were successful in finding "old man booster" and were given prizes of $10 each. The winners were J. E. Burke, Frank Bingham, and Miss McKim. Represented by B. Andres, P. F. Meigs, and F. O. Wyse.

Cincinnati Rubber Co., Cincinnati, Ohio—Displayed several photographs of installations in the sand and gravel industry of their conveyor belts. Also samples of these belts. Represented by L. P. Darnell, J. W. Reed, and C. M. Young.

Clinton Motors Corp., Reading, Penn.—Displayed several panels of photographs of the Clinton conveyor-conditioner in operation pouring ready-mixed concrete in various localities. Also displayed a glass model of the tank which illustrated how the air escapes during the mixing. Represented by G. M. Bunn.

Colprovia Roads, Inc., New York, N. Y.—Displayed samples of asphaltic concrete quarry type and Topeka mix of Colprovia, a process under which all types of asphaltic pavements are produced without the use of heat in the manufacture or laying. Represented by J. A. Dow.

Cross Engineering Co., Carbondale, Penn.—Exhibited samples of perforated screen plate and plate for vibrating screens manufactured of "Rol-man" manganese steel and special alloys. Represented by W. S. Nicol.

Deister Concentrator Co., Ft. Wayne, Ind.—A new feature in this exhibit was a machine which showed in graph form the vibration motion obtained in their screens. Exhibited a full size 3x6-ft. double-deck Leahy screen and a laboratory type 17x32-in. vibrating screen. Represented by C. W. Fugate and S. A. Stone.

Deister Machine Co., Ft. Wayne, Ind.—Displayed a full size 3x8-ft. double-deck "Plat-O" vibrating screen. Also catalogs and photographs of installations. Represented by I. F. Deister and B. J. Roberts.

Dorr Co., New York, N. Y.—Displayed a working model of "Dorrco" sand washer. Also showed moving pictures of actual working installations of this washer. Represented by C. T. Leander and C. Y. Pfontz.

Dravo Contracting Co., Pittsburgh, Penn.—This company used two booths to display several large photographs and blueprints of barges, Diesel-engine tow boats, Dravo whirler and dredges. Also a model of the Dravo marine ways. Represented by V. B. Edwards, B. H. Kersting, and D. B. Newton.

Eagle Iron Works, Des Moines, Ia.—Exhibited working models of the "Eagle" washer, flume sand classifier and Swintek screen nozzle ladder. Also showed moving pictures of the Swintek ladder in operation in sand and gravel plants. Represented by T. Aulmann, O. G. DuPuis, and C. B. Laird.

Elwood Manufacturing Co., Lafayette, Ind.—Displayed samples of gravel that had been cleaned by their "Elmco" scrubber, a new piece of equipment recently introduced for general use in the sand and gravel industry. Represented by D. Dwyer.

Fairbanks-Morse & Co., Chicago, Ill.—Displayed several photographic panels of F-M Diesel engines in sand and gravel and excavating service. Also centrifugal pump direct-connected to an F-M ball-bearing motor. Represented by D. L. Arnold, J. A. Brown, G. J. Podlesak, and T. M. Robie.

Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, O.—Several panels of photographs and reprints of advertisements of various types of gasoline and Diesel locomotives for sand and gravel plant service were displayed. Represented by J. L. Smith.

General Electric Co., Schenectady, N. Y.—Displayed an enclosed fan cooled motor for use under dirty, dusty or moist conditions. Also a photoelectric relay set up so as to operate a movable sign by passing a card through the light beam to a photoelectric cell. Two years ago a similar photoelectric cell control was shown at the convention as a laboratory development; the device today is a commercial product and is being used for throwing switches, opening doors, gates or any place where a straight line thrust through a short distance is desired. Represented by K. H. Runkle and L. W. Shugg.

Good Roads Machinery Co., Kennett Square, Penn.—Displayed working models of double-deck vibrating screen, and sand drag; also models of No. 6 and No. 10 Champion jaw crusher. Represented by E. C. Brown and L. C. Perry.

Harnischfeger Sales Corp., Milwaukee, Wis.—Displayed a working model of the P & H Model 600 electric shovel digging in sand and gravel. Also photographs illustrating excavating equipment. Represented by H. M. Davison, J. H. Enochs, and P. A. Raiche.

Hayward Co., New York, N. Y.—Displayed models of dragline, clam-shell and orange-peel buckets. Represented by E. J. Robeck.

Heltzel Steel Form & Iron Co., Warren, Ohio—Displayed several panels of photographs showing the arrangement of the Heltzel multiple weighing Agrabatcher and batching units in ready-mixed concrete plants. Represented by C. W. Davis and R. R. McBride.

Hendrick Manufacturing Co., Carbondale, Penn.—Displayed Weston testing screen for samples of sand and stone; also several samples of perforated screen plates for vibrating screens and also flat plates. Represented by D. M. Blackburn and B. G. Shotton.

Hetherington & Berner, Inc., Indianapolis, Ind.—Displayed a model of dredge pump embodying anti-friction bearings. Also a model of bottom-discharge stone trap. Represented by C. J. Hodge, J. I. Hurst, and W. D. Kinnaird.

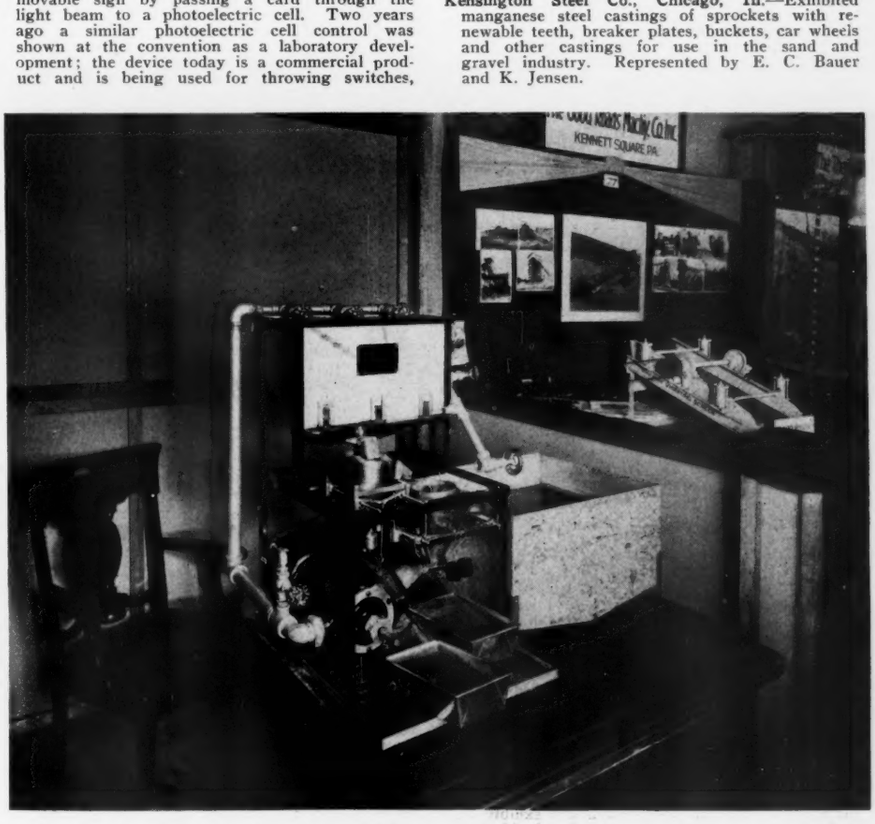
Hitchcock Co., Inc., Boston, Mass.—Displayed samples of conveyor belting that had been surfaced with "Covulc," a plastic rubber compound for renewing conveyor belts and for lining chutes, hoppers, etc. Represented by N. W. Fleming and W. A. Heppler.

Hug Co., Highland, Ill.—Displayed photographic panels showing trucks, equipped with ready-mixed concrete bodies and also dump bodies for transporting sand and gravel. Represented by R. A. Bliss and C. J. Hug.

Huron Industries, Inc., Alpena, Mich.—Exhibited double-deck 3x6-ft. vibrating screen. Also a small working model of live-roll grizzly and Huron seal ring. Represented by B. E. Green and F. H. Schwarz.

Jaeger Machine Co., Columbus, Ohio—Showed moving pictures of truck mixer and agitator bodies in operation. Also displayed photographs of equipment. Represented by H. L. Bachman, D. Gould, C. C. Riordan, G. F. Smith, and L. Seymour.

Kensington Steel Co., Chicago, Ill.—Exhibited manganese steel castings of sprockets with renewable teeth, breaker plates, buckets, car wheels and other castings for use in the sand and gravel industry. Represented by E. C. Bauer and K. Jensen.



Newest in sand classifiers—a working model; perhaps the most popular exhibit

A. Leschen & Sons Rope Co., St. Louis, Mo.—Displayed samples of "Hercules Red-Strand" wire rope. Also catalogs and literature. Represented by D. G. Bergland, Jr., A. H. Depelheuer, L. H. Gault, R. C. Niedringhaus, and W. C. Richards.

Link-Belt Co., Chicago, Ill.—Exhibited a Shaw classifier, working model vibrating screen, Timken roller-bearing belt conveyor idler and P. I. V. gear variable speed power transmission. Represented by C. S. Huntington, W. W. McKee, and A. K. Schifflin.

Ludlow-Saylor Wire Co., St. Louis, Mo.—Exhibited samples of wire cloth of all sizes. Represented by J. L. Ashcroft, E. G. Doernhoefer, E. S. Robson, and F. B. Ungar.

Manganese Steel Forge Co., Philadelphia, Penn.—Exhibited a section of "Rol-man" double lock mesh screen which had handled more than a million tons of sand and gravel on a rotary scalper before replacement. Also samples of double-lock mesh screens, fine mesh screen cloth (2- to 16-mesh), rolled manganese steel plate, perforated rolled manganese steel plate for screening, bolts, pins and bushings of rolled and forged manganese steel, special rolled and forged manganese steel chain. Represented by W. H. Potter and J. G. Logan.

Marion Steam Shovel Co., Marion, Ohio—Displayed several photographic panels showing Marion shovels in use in sand and gravel operations. Represented by G. W. Davisson and E. R. Wilson.

McLanahan & Stone Corp., Hollidaysburg, Penn.—Exhibited working models of steel constructed single-roll crusher and a double steel-log washer. Also catalogs and photographs of other equipment for use in the sand and gravel industry. Represented by J. C. McLanahan and E. B. Taggart.

Midwest Locomotive Works, Hamilton, Ohio—Displayed literature and photographs of line of gasoline, Diesel, gas-electric and Diesel-electric locomotives. Represented by A. E. Ainlay.

Morris Machine Works, Baldwinsville, N. Y.—Displayed a model of Type H line pump. Also a model of 5-drum dredge hoist and several photographs of equipment installed in sand and gravel dredges. Represented by V. J. Milkowski, and F. S. Salchenberger.

National Equipment Corp., Milwaukee, Wis.—Displayed a model of new ready-mixed concrete mixing drum. Also photographs and literature of line of excavating equipment. Represented by H. B. Jones and C. F. Rabbeitt.

National Safety Council, Chicago, Ill.—Displayed panels showing bulletins and pamphlets to promote safety in industry. Represented by J. V. Scott.

National Sand and Gravel Association, Washington, D. C.—Displayed several panels of graphs showing the weekly car loadings of sand and gravel. Also graphs showing production figures for the industry in tons and dollar value. The St. Louis district office of the Association also had a booth in which were displayed charts showing the results obtained by simplifying specifications. Represented by (Washington office) V. P. Ahearn, C. E. Proudly and Stanton Walker. (St. Louis office) D. D. McGuire and J. McGuire.

Niagara Concrete Mixer Co., Buffalo, N. Y.—Exhibited a full size 4- x 8-ft. double-deck vibrating screen in operation. Represented by H. C. Avery and A. E. Owens.

Nordberg Manufacturing Co., Milwaukee, Wis.—Exhibited a Symons rocker screen in operation. Also a working model of the Symons cone crusher, showing the construction and operation principles. Represented by A. C. Colby, C. H. Gant, L. D. Hudson, L. D. Hudson, Jr., and J. M. Thistlewaite.

Northwest Engineering Co., Chicago, Ill.—Exhibited a full size dragline bucket. Also several panels of photographs and literature covering line of excavating equipment. Represented by H. A. Hutchins and N. Funk.

Ohio Power Shovel Co., Lima, Ohio—Displayed a large panel showing a "Lima 101" shovel loading material to cars. Also literature covering their line of power shovels for sand and gravel work. Represented by H. Barnhart, D. W. Healy, R. K. Wills, and F. K. Wolcott.

Osgood Co., Marion, Ohio—Displayed photographic panels showing their line of gasoline, steam, electric and Diesel shovels. Represented by E. C. Smith.

Perfect Classifier Co., Nashville, Tenn.—Displayed a working model of sand and gravel classifier. Also blueprints showing detailed construction. Represented by H. H. Hooper and S. R. Puryear.

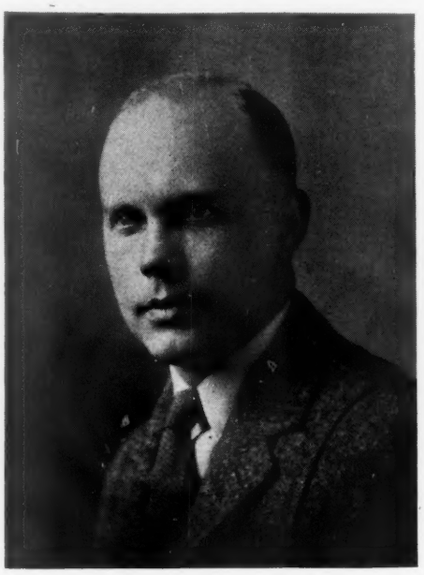
"Pit and Quarry," Chicago, Ill.—Displayed copies of current issues of publication. Represented by M. F. Beisber, W. A. Buschman and S. A. Phillips.

Robins Conveying Belt Co., New York, N. Y.—Exhibited a working model of the new Adams avalanche, withdrawal and floating chutes designed to prevent breakage and segregation. Another display was maintained by this company at a nearby location where there was exhibited a full sized 1931 model 5- x 10-ft. double-deck "Gyrex" screen in operation. Also newly developed conveyor and idler rolls. Among the latter was the "Belt-trainer," a return idler for keeping the belt running straight. Other standard types of Robins idlers were also displayed. Represented by M. S. Lambert, E. R. Morgan, and O. A. Ohmann.

"Rock Products," Chicago, Ill.—Displayed copies of current issues of publication, including the Annual Review Number of 1931. Represented by E. C. Harsh, W. B. Lenhart, N. C. Rockwood, and R. C. Sullivan.

John A. Roebling's Sons Co., Trenton, N. J.—Displayed samples of various sizes of screen cloth. Also wire rope and welding rod. Represented by J. F. Berger, D. J. Norton, and D. W. Vernon.

Ross Screen and Feeder Co., New York, N. Y.—Displayed a working model of the Ross chain feeder, screen feeder and grizzly feeder. Also photographs of installations of the feeders in operation in the sand and gravel and other industries. Represented by E. Webster.



M. B. Garber, chairman Manufacturer's Division

Sauerman Bros., Chicago, Ill.—Exhibited working models of the Sauerman slackline cableway and dragline systems. Represented by L. V. Fraley, J. W. Schufreider, and G. H. Tompkins.

Simplicity Engineering Co., Durand, Mich.—Exhibited a full size 3x6-ft. scalping type vibrating screen. Also photographs of their dewatering wheel. Represented by F. D. Barber, G. W. Behnke, F. Buell, J. S. Davidson, R. Dunckel, J. B. Gower, C. W. Harder, and E. H. Martin.

Smith Engineering Works, Milwaukee, Wis.—Displayed several large drawings showing sand drag, log washer, double rewasher, reduction crusher, primary breaker, double-deck vibrating screen, Hercules gravel washer, Wheeling jaw crusher, etc. Also catalogs covering line for complete sand and gravel plants. Represented by C. W. Buehler, V. H. Jones, and J. M. Titzel.

Stearns Conveyor Co. (Division of Chain Belt Co.), Cleveland, Ohio—Displayed Style No. 39 idler; also a rubber-covered idler and Style No. 31 pressed steel idler. Several panels of photographs illustrated the "Rex Moto-Mixer." Catalogs covering equipment for concrete factories and other lines of equipment were displayed. Represented by P. Gagmt, J. F. Hacker, G. H. Kunz, and L. B. McKnight.

Stephens-Adamson Manufacturing Co., Aurora, Ill.—Exhibited an illuminated display of S-A installations showing equipment for conveying, storing, reclaiming and material handling. Also exhibited an idler and the J. F. S. variable speed reducer. Among the catalogs and literature displayed was the recently issued one on ready-mixed concrete plants. Represented by C. H. Adamson, J. J. Fasmer, M. A. Kendall, C. A. Krause, F. H. McWethy, E. J. Patton, T. A. Ruddy, and J. G. Stewart.

Taylor-Wharton Iron and Steel Co., High Bridge, N. J.—Exhibited manganese-steel castings of crusher parts, elevator buckets, jaw plates, and other wearing parts. Also displayed "Timang" (air-toughening) steel welding rod, and in addition displayed stainless steel castings. Represented by B. M. Judson, H. F. McDermott, and J. C. Taylor, Jr.

Thew Shovel Co., Lorain, Ohio—Displayed several large photographic panels of the "Lorain 75" shovel and crane operating in sand and gravel plants. Represented by M. B. Garber, J. O. M. Smith, and R. W. Smith.

Traylor Engineering & Manufacturing Co., Allentown, Penn.—Displayed catalogs and bulletins covering line of crushing and screening equipment. Represented by O. E. Thaleg.

W. S. Tyler Co., Cleveland, Ohio—Exhibited various size samples of wire cloth and "Ton-cap" screens. Also "Ro-tap" testing sieve shaker and a set of Tyler standard screen scale testing sieves. Displayed several photographs of "Hum-mer" vibrating screens. Represented by A. D. Busch, W. W. King, and W. J. Piggott.

Vaso Manufacturing Co., Seattle, Wash.—Displayed several samples of concrete in which "Vaso," an admixture, had been used. Represented by C. L. Leon.

Vulcan Iron Works, Wilkes-Barre, Penn.—Displayed photographs and broadsides of line of steam, gas, Diesel, Diesel-electric, gas-electric, trolley and storage battery locomotives. Represented by J. F. O'Brien.

F. M. Welch Engineering Service, Greenville, Ohio—Exhibited a small model of the Allswede scrubber, showing its construction and operation. Also several photographs of the Greenville stacker. Represented by F. M. Welch.

Chas. E. Wood, Baxter Springs, Kan.—Exhibited a working model of "Auto-Vortex" classifier, an automatic hydraulic sand classifier and washer, of all metal construction and automatic cone type. Represented by C. E. Wood.

U. S. Bureau of Mines, Washington, D. C.—Displayed several charts and bulletins on mining, crushing costs and methods, production graphs, accident rates, etc. Also showed animated figures representing a workman giving artificial respiration to another, showing remedy for electric shock, drowning or asphyxiation. Represented by A. A. Munsch and J. R. Thoenen.

U. S. Bureau of Public Roads, Washington, D. C.—Displayed three types of roads showing cross sections of the construction for a concrete road, bituminous concrete road and gravel road.

Machinery Manufacturers Other Than Exhibitors

Aluminum Co. of America—A. L. Spiegel, St. Louis, Mo.

American Cable Co.—W. W. Ferrel, St. Louis, Mo.

American Car and Foundry Co.—A. M. Farrier, New York, N. Y.; J. B. Herman, St. Louis, Mo.

O. B. Avery Co.—H. R. Vogel, St. Louis, Mo.

Broderick and Bascom Rope Co.—H. F. Lamwersiek, St. Louis, Mo.

Busch-Sulzer Bros. Diesel Engineering Co.—W. C. Burgy, St. Louis, Mo.

English Bros. Machinery Co.—L. E. Mathews, Kansas City, Mo.

Godfrey Conveyor Co.—D. H. Herbster, Elkhart, Ind.

Hazard Wire Rope Co.—W. H. Slingluff, Chicago, Ill.

Johns-Manville Corp.—George Conahey, New York City.

C. S. Johnson Co.—John C. McLean, Champaign, Ill.

Komnick Werke—Albert F. Seelig, St. Louis, Mo.

H. J. Miller Lumber Co.—H. J. Miller, Seattle, Wash.

J. S. Morrison Co.—W. G. Swift, Pittsburgh, Penn.

Neff and Fry Co.—E. N. Heim, Camden, Ohio.

Ransome Concrete Machinery Co.—H. C. Peters, Dunellen, N. J.

Shell Petroleum Corp.—David Waxman, St. Louis, Mo.

Toledo Scale Co.—H. C. Mathias, Toledo, Ohio.

Transit Mixers, Inc.—Edwin F. Hill, Jr., San Francisco, Calif.

Universal Crusher Co.—E. A. Velde, Cedar Rapids, Iowa.

Westinghouse Electric and Manufacturing Co.—H. F. Hedderick, St. Louis, Mo.

W. A. Zelnicker Supply Co.—W. H. Dyer, M. F. Muir, St. Louis, Mo.

McGrath Sand and Gravel Co. to Expand Operations

McGRATH SAND AND GRAVEL CO., INC., Lincoln, Ill., which operates plants at Chillicothe, Forreston, Pekin, Shawneetown and Mackinaw, Ill., according to reports, has purchased the Charles Boyle farm west of Mackinaw and will expand its operations there with the erection of a new $165,000 plant.

Mining, Treatment Methods and Costs, Menantico Sand and Gravel Co., Millville, N.J.*

By Hugh Haddow, Jr.

One of the Consulting Engineers of the Bureau of Mines; Vice-President and General Manager, Menantico Sand and Gravel Co.

THIS PAPER describing the methods of recovery and treatment of a sand and gravel deposit and the preparation of these materials for a number of special markets is one of a series being prepared by the U. S. Bureau of Mines. It is of particular interest to those sand and gravel operators who have a surplus of fine sand which must be sent to waste, both from the point of view of equipment and the variety of markets supplied, and in that it describes one of the few sand and gravel plants which have resorted to hydraulic classification for sizing fine sand.

The author wishes to acknowledge the assistance of J. R. Thoenen, mining engineer of the Bureau of Mines, in the preparation of this paper.

History

In the early operation of the deposit sand and gravel for making concrete were the only products. Later on the demand for special sands necessitated separate plant units for their preparation, which was followed by the erection of another separate plant for the utilization of the fine sand wasted from former operations, as markets were developed for this material. The present plant is the result of a gradual development brought about by the necessity of producing various special kinds or gradings of sands and gravels.

Previous to the formation of the present company the deposit had been worked in a small way for the production of concrete gravel and blast sand. In the spring of 1914 the present company took over the property and constructed an entirely new plant. At that time the only outlet for material was a small market for concrete gravel in Atlantic City and a fair market for blast sand in New Jersey and Eastern Pennsylvania. Several sand plants were already in operation in this section but they were almost entirely occupied in supplying sand to glass factories, foundries, and for water filtration.

The property consists of about 300 acres with a small stream, Menantico creek, running through it close to the western boundary. The Pennsylvania railroad tracks traverse the property on the southern edge so that excellent transportation is afforded.

Description of Deposits

The deposits at Millville are all of fine sand and gravel that offer no serious difficulty to the operation of a pump dredge. On the property are two classes of deposits which are called Highland and Lowland. The Highland deposit extends from 10 to 20 ft. above water to an average of 20 ft. below water level. This deposit has no overburden and supports a weak growth of scrub oak and pine. The Lowland deposit is adjacent to the stream and extends from 2 to 5 ft. above water to an average depth of 22 ft. below water level. The overburden on this deposit is decayed vegetable matter mixed with sand and forms a black mat from 6 in. to 3 ft. in thickness over the deposit.

Physical Characteristics

Gravel deposits in all of southern New Jersey are of small area and adjacent to small streams. The gravel itself is unusually small with almost none over 2 in. in size. On the other hand, sand of almost every size is found in abundance.

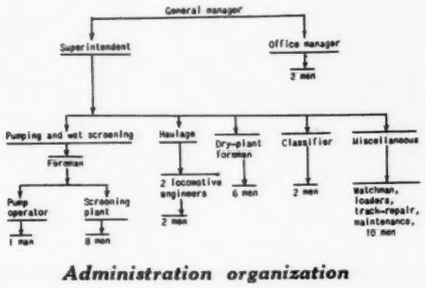
The Lowland deposit is comparatively shallow, but consists largely of gravel and coarse sand, and was the first deposit worked because it contained from 20 to 25% of gravel and about 35% of coarse sand, which were the only products of value during the early operation of the deposit. The balance of fine sand was then considered as waste.

Chemically, the material shows an analysis of from 96 to 98% silica and is uniform throughout. The sand is angular and hard, and the gravel is practically all quartz.

Prospecting and Exploration

The first explorations were by means of test pits dug by hand. These proved of little value as they could only be sunk to a limited depth. A contract was then made for drilling test holes over that portion of the deposit which it was desired to explore. These test holes were put down by hand at a contract price of $1.50 per ft. and spaced approximately 100 ft. apart in each direction.

At present the method of prospecting is to dig test holes with a small Hayward orange-peel bucket worked by hand. The bucket digs a hole about 12 in. in diameter and is used above the water line inside a steel-pipe casing. Below the water line a 4-in. pipe is sunk as a casing within which a drill tool is operated. This tool is made from a piece of 3-in. pipe about 4 ft. long with one end filed off to a rough cutting edge. A few inches above this edge a flap valve is placed opening upward. The tool is suspended from a light tripod by a ½-in. rope running through a pulley, and is operated by hand. Three men are used in this work and average about 50 ft. of drilling per day at a cost of 30c per lin. ft.



Administration organization

Choice of Method

Originally the desired product was concrete gravel and coarse sand which occurred in the best quantities in the Lowland deposit. The overburden being of no value whatever, had to be disposed of as quickly and economically as possible, so it was cast into the pond formed by previous workings.

In order to use the equipment taken over in the purchase of the property, consisting of a Browning locomotive crane and an "A" frame derrick, both equipped with 1-yd. buckets, a screening plant was constructed close to the railroad track and dry plant. The material was dug by the crane and derrick, loaded in 4-cu. yd. side-dump cars and hauled by a steam locomotive to the screening plant.

The cars were dumped into a hopper and the material raised by a continuous bucket elevator to a jacket screen which separated the sand from the gravel. The gravel was loaded by gravity either into cars or a storage bin, and the sand was discharged into a wash box which separated it into coarse and fine sand. The coarse sand was for use as blast sand and the fine sand was wasted.

The disposal of this fine sand eventually became an acute problem so some change was necessary. Then too, by this time, a change in the market was evident. An increased demand for a properly prepared concrete sand was evident, as well as a demand for a fine sand that could be used for plastering and brick mortar. In order to meet this demand it was decided to entirely revamp the plant.

Due to the shallowness of the deposit and because it contained no boulders or large stones, it was decided that a pump dredge would handle the material cheaper than any other device. In order to avoid pumping long distances, an inexpensive screening

*Reprinted from U. S. Bureau of Mines Information Circular 6420.

plant was built which could be replaced by another plant in a new location when the pumping distance became too great. As steam power only was available, the dredge was constructed to accommodate boilers and an engine, and as there was no way of getting a dredge hull to the property it had to be built at the site.

In 1926 electric power became available and since the boiler equipment was reaching a state where renewals were necessary it was decided to equip the plant throughout with electric machinery. This change was made during 1926 and the electric machinery has proven more efficient and less expensive to operate than the steam-operated equipment.

During all this time the market was broadening and a demand was appearing for a greater variety of grades in both sand and gravel.

The demands were met and in some cases anticipated by the construction of new plants for special purposes, until at present four plants are in operation consisting of a wet-screening plant for the preparation of concrete gravel, concrete sand and fine or plastering sand; a dry plant for the production of blast sand; a re-screening plant for the preparation of filter gravel; and a hydraulic-classifier plant for the preparation of special sands for such purposes as molding, core, filter, and slate-rubbing sand.

This last plant was built to utilize the fine sand which had been discarded as waste during previous operations. The flow sheets of the various plants are shown in Figs. 1, 2, 3, and 4.

Dredge

When originally built, the dredge hull had to accommodate a Corliss engine and boilers so that it is somewhat larger than is necessary at present. The hull is 30 by 70 by 5 ft. deep and is built throughout of long-leaf yellow pine. The deck and sides are of 3-in. planks and the bottom planks are 4 in. thick. A deck house of galvanized iron covers all equipment. The details of this hull are shown on the accompanying plan (Fig. 5).

The equipment consists of a 12-in. Morris Machine Co. sand pump with Taylor-Wharton manganese-steel removable liner, side plates, and impeller. The pump is driven by a direct-connected 300-hp. General Electric synchronous motor using 4000-volt, 3-phase, 60-cycle, current. Synchronous motors were selected on account of low initial cost and a power factor affording a 5% reduction of current consumption.

To eliminate starting troubles the motor is equipped with an automatic starter and push-button control so that to stop or start the pump all the operator has to do is to push the button.

For priming there is a 1½-in. Nash vacuum pump driven by a 2-hp. motor and there is also a 2-in. D.S.V.M. pump driven by a 7½-hp. motor which provides a water seal to keep sand out of the main bearing.

The suction line is suspended from an "A" frame by wire cables and is raised and lowered by a hoisting engine driven by a 20-hp. induction motor.

Current for these small motors and for lighting the boat is furnished from a bank of three 10 kv.a. transformers which reduce the 4000 volts to 220 volts for the motors and 110 volts for the lighting circuit.

The dredge is moored to convenient points on the shore by wire cables which are operated by hand winches.

Pipe Line

Various types of pipe have been used in the discharge lines, but the most satisfactory has been pipe made by the American Rolling Mills Co. of a special analysis steel with welded seams. This pipe is carried over the water on pontoons each 8 by 4 by 2½ ft. For convenience in handling, the pipe line is generally made up with rubber sleeves about every 40 ft. The pipe line is 12 in. in diameter throughout and at the screening plant is carried up a long incline to a point of discharge 32 ft. above the loading track.

Screening Plant

The pipe line discharges on the narrow end of a fan-shaped spreading table which slopes ⅞ in. in 1 ft. toward the stationary screens. This table is 20 ft. wide at the lower end and spreads the material in a thin layer. The material flows from this table on to a woven wire screen 20 ft. long and 4 ft. wide. This screen is set at an inclination of about 45 deg. and so located that the discharge from the table hits the top of the screen.

As there is practically no material over 2 in. in size the screen used is 2 meshes to the inch of 0.162-in. wire, giving a clear opening of 0.338 in. The purpose of this screen is to separate the gravel from the sand; the gravel is discharged into a chute which conveys it to two parallel revolving screens each 16 ft. long and 36 in. in diameter and equipped with sand jackets 12 ft. long. The purpose of these screens is to remove small roots or trash from the gravel and also to screen out any sand not removed by the stationary screen. The inner section of the screen is punched metal with holes 1½ in. in diameter, while the sand jacket is punched with holes 5/16-in. in diameter.

The material passing the inner screen and retained on the sand jacket is therefore gravel from 5/16 to 1½ in. in diameter and is chuted directly into cars, there being no gravel bins at the plant. The sand passing through the jackets enters a hopper from which it is loaded by gravity into small cars which convey it to the dry plant over a narrow-gage track.

The sand passing the 2-mesh stationary screen is carried into a series of sand cones of the Dull type which dewater the sand and also remove any excess of fines which may be present. These cones discharge the dewatered sand directly into cars for shipment as concrete sand. When fine sand for plastering is desired another screen similar to the 2-mesh screen but with 8-mesh openings is placed directly behind the 2-mesh screen. This screen separates the sand into fine and coarse sand. The coarse sand rejected by this 8-mesh screen enters a hopper and is loaded by gravity into narrow-gage cars which take it to the dry plant. The fine sand passing the 8-mesh screen goes to the dewatering hoppers and is loaded into cars for shipment as plaster sand.

To facilitate handling these screens they are made in three sections, each 6 ft. 8 in. long on wooden frames.

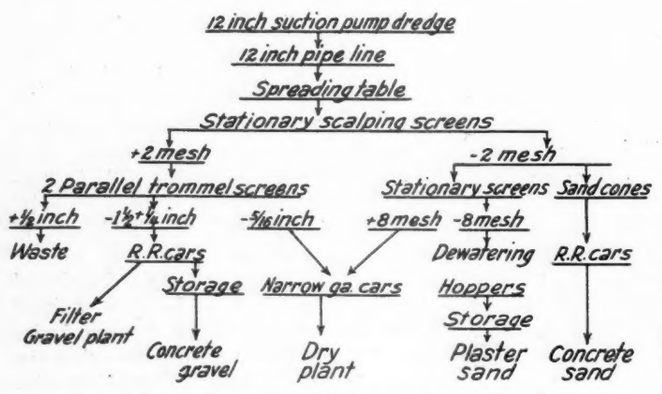


Fig. 1. Flow sheet of sand and gravel or wet plant

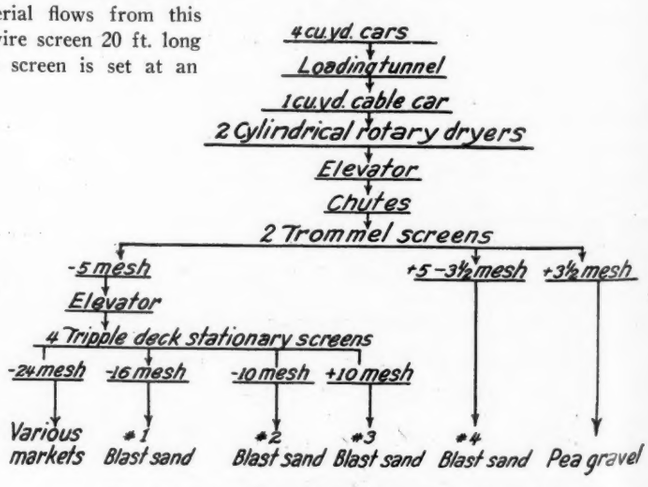


Fig. 2. Flow sheet of blast-sand or dry plant

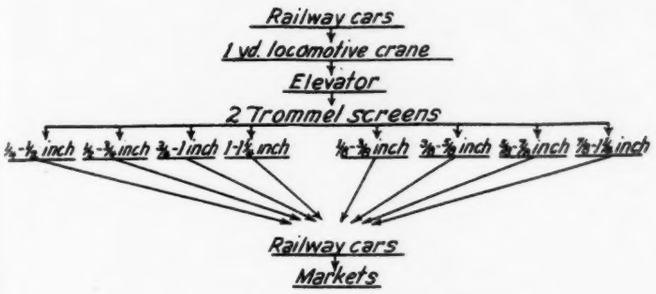


Fig. 3. Flow sheet of filter-gravel plant

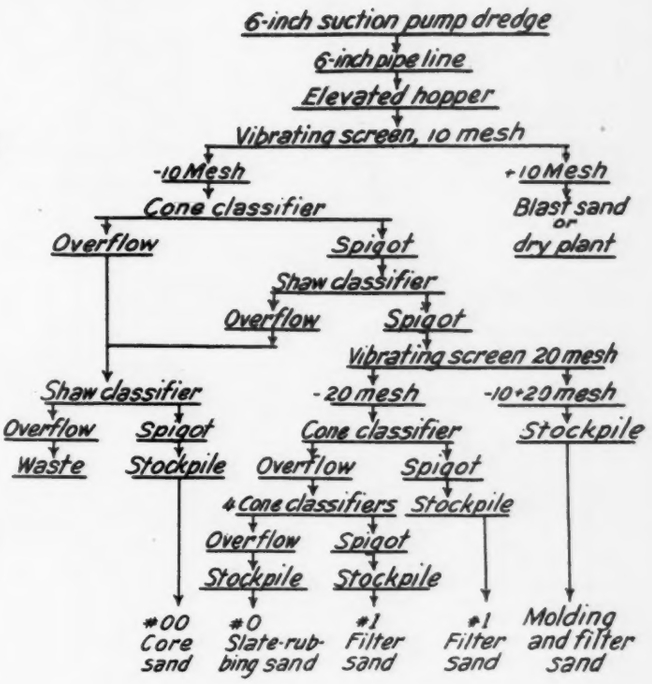


Fig. 4. Flow sheet of classifier plant

Dry Plant

The dry plant is operated to produce blast sand and filter sand which are shipped in box cars. The raw material used is the coarse sand produced at the wet plant, which is loaded at the wet plant in 4-cu. yd. cars on a 3-ft. gage track and hauled by gasoline locomotive to an elevated trestle and dumped on a storage pile. This storage pile covers a concrete tunnel in which there is a 24-in. gage track carrying two 1-cu. yd. Koppel side-dump cars.

The sand is loaded into these cars through gates in the roof of the tunnel and the cars are then hauled up an inclined trestle by cable to the receiving hopper of the dryers.

There are two rotary-type direct-heat dryers, each with a rated capacity of 20 tons per hour, and using low-volatile coal for supplying heat, the consumption of fuel being about 1½ tons per day in each dryer. The dryers are belt driven by a 50-hp. synchronous motor.

The wet sand is dumped from the Koppel cars into feed hoppers located over the dryer furnaces and is fed through a gate into the receiving end of the dryers. The dryers make 15 r.p.m. and discharge the dry sand into a hopper. From this hopper the sand is picked up by a bucket elevator, raised 35 ft. and discharged into two parallel revolving screens, each 12 ft. long and 36 in. in diameter. Each screen is in two sections, the first of which is equipped with wire cloth having 5 meshes to the inch and the second with wire cloth having 3½ meshes to the inch.

The material passing the 5-mesh screen drops into a small hopper and is raised 10 ft. by a bucket elevator for further screening.

The material retained on the 3½-mesh screen is oversize and is disharged into a loading bin for market as pea gravel. The material passing the 3½-mesh screen also goes to a storage bin as No. 4 blast sand.

The sand which has passed the 5-mesh screen after being raised by the bucket elevator is discharged into chutes which open on to four parallel stationary screens.

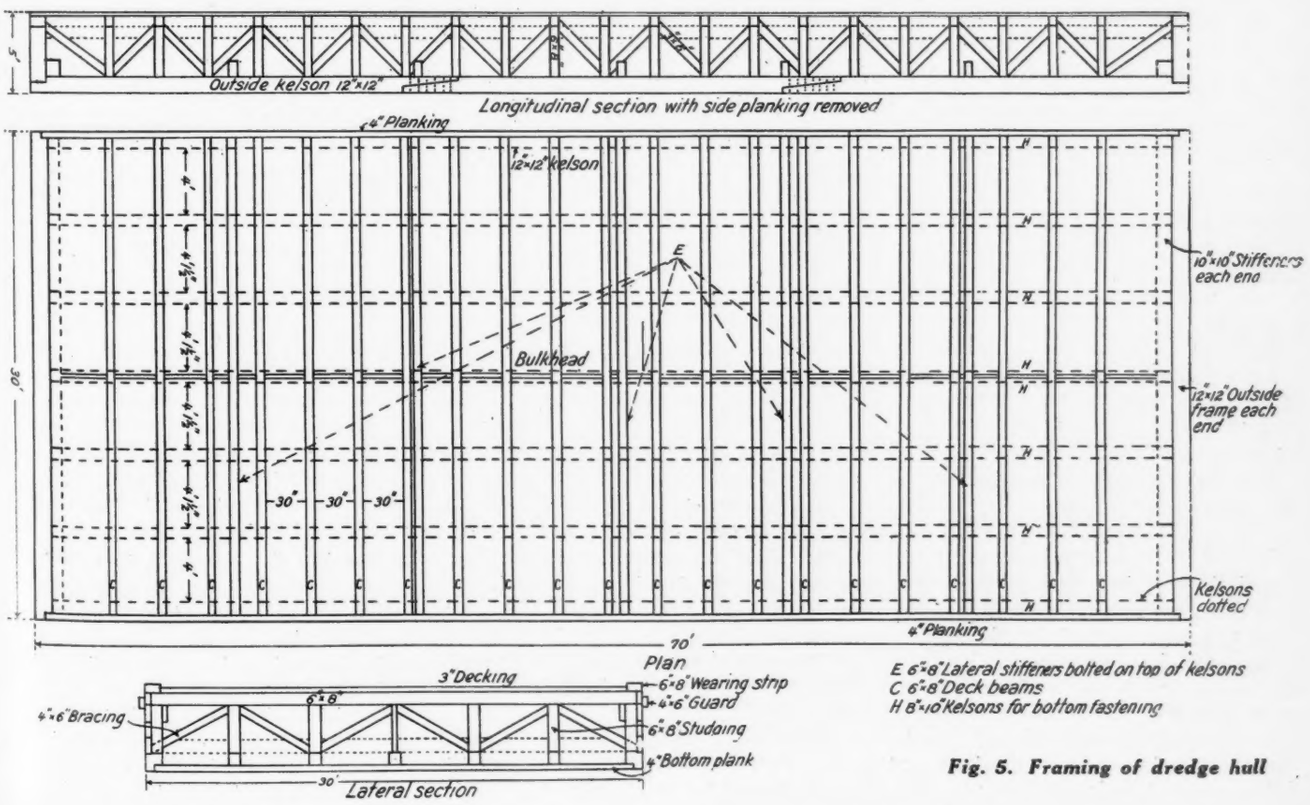


Fig. 5. Framing of dredge hull

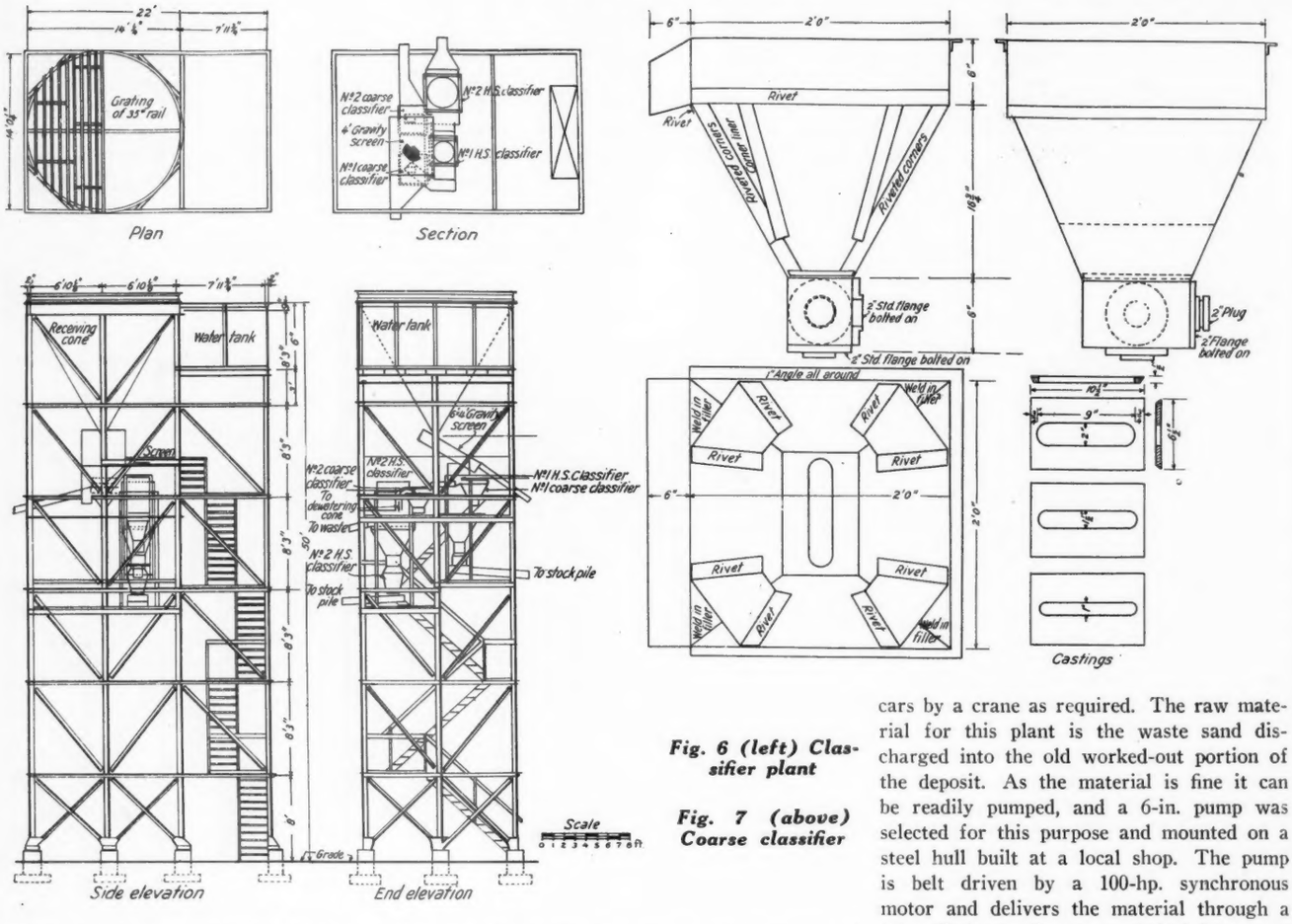


Fig. 6 (left) Classifier plant

Fig. 7 (above) Coarse classifier

These four screens are alike and have triple decks 18 in. wide but varying in length. The upper deck, 20 ft. long, is of 10-mesh wire cloth. Material retained on this screen is No. 3 blast sand and is chuted to a storage bin. The second deck of the screen is about 30 ft. long and is of 16-mesh cloth. The material from this screen is also chuted to its bin ready for loading as No. 2 blast sand. The third deck of the screen, about 40 ft. long, is of 24-mesh cloth and the material retained on this screen is the smallest size or No. 1 blast sand. It also is discharged into a storage bin. All of these bins are inside the building so that the sand is kept dry.

The sand which passes through the last screen is too fine for blast sand, but is chuted into an inclosed bin and is sold as a special product for use in several different industries.

The gravity screens are assembled in sections, each 10 ft. long and mounted on light wooden frames so that the replacements are easily made. The screens have an inclination of about 45 deg., so that the material flows over them slowly.

Six men are employed in this plant; a foreman who is also the locomotive crane operator, an engineer in charge of the motor room and who operates the hoisting engine that pulls the cars of raw material from the tunnel; a laborer who loads and discharges tunnel cars; a laborer who feeds the dryers and also attends the furnaces; a laborer in the screening plant and a laborer as helper on the crane. In loading cars the material is chuted into the hopper of a Pratt box-car loader and placed in the car; the loading is completed by the machine.

Classifier Plant

During many years of operation a large amount of fine sand accumulated, which was looked upon as a waste product.

Chemical and physical analysis showed that this sand if properly graded could be made to meet the requirements of various industries.

As this sand was very fine, and of course wet, it seemed impossible to devise a screening method that would give satisfactory results. It was decided to attempt to get the required results by hydraulic classification. A plant was designed by and erected under the supervision of Edmund Shaw, using Shaw classifiers and cones. With a few minor changes and the addition of two Tyler vibrating screens this plant (see Fig. 6) has proved entirely successful.

The flow sheet may appear somewhat complicated, but the plant has been able to produce several grades of sand that have found a ready market which is still being extended.

The classifier plant was erected 50 ft. from the railroad track so that material produced could be stock-piled and loaded in cars by a crane as required. The raw material for this plant is the waste sand discharged into the old worked-out portion of the deposit. As the material is fine it can be readily pumped, and a 6-in. pump was selected for this purpose and mounted on a steel hull built at a local shop. The pump is belt driven by a 100-hp. synchronous motor and delivers the material through a 6-in. discharge line to a conical hopper at the top of the plant, 50 ft. above the track elevation.

As the proper operation of this plant requires regular feed the discharge from the hopper is through a gate, the opening of which can be easily regulated. The hopper discharge is fed to a 10-mesh Tyler vibrating screen. All material retained on this screen is chuted to a stock pile and treated in the dry plant. The material passing the 10-mesh screen enters a cone classifier for preliminary classification (Fig. 7). The spigot discharge from this cone enters a Shaw hindered-settling classifier (Fig. 8) and is divided into two components. The overflow from this classifier unites with the overflow from the first cone classifier and all this material enters a second Shaw hindered-settling classifier. The spigot discharge from this second classifier is very fine sand and is stock-piled ready for loading as core or foundry sand. The overflow of this classifier is waste.

The spigot discharge from the first classifier falls on a Tyler 20-mesh vibrating screen. Material retained on this screen is therefore minus 10 plus 20-mesh and is stock-piled and used as filter and molding sand.

Material passing the 20-mesh screen flows into a third Shaw classifier, producing a spigot product of minus 20 plus 35-mesh, which is sold as filter sand.

The overflow from this classifier passes through four Deister cone baffle-classifiers arranged in series. These reclaim any filter sand carried over in the overflow of the third Shaw classifier. The spigot discharge of these classifiers is therefore filter sand, while the overflow is a somewhat finer sand which is used in slate cutting and rubbing as well as for foundry work.

Filter-Gravel Plant

In order to produce the various sizes of gravel demanded for filters, a small gravel rescreening plant was built. This plant consists of two parallel revolving screens so constructed that the punched metal plates can be easily changed to accommodate the requirements as to size of gravel. The plant is 30 ft. high, the gravel being raised by bucket elevator to the screens, discharged by gravity to ground storage and loaded into cars by a locomotive crane.

Water required in both the classifier and filter-gravel plants is supplied by a 6-in. centrifugal pump driven by a 20-hp. General Electric motor and in order to secure a constant head in the classifier plant a tank is provided at the top of the plant to which the water is pumped. Each classifier receives water by separate pipe line from this tank.

WAGE SCALE

		Per month
Foreman	2	$200.00
Watchman	1	125.00
		Per hour
Engineer	1	$0.675
Mechanic	1	.60
Pump runner	1	.60
Crane operators	2	.55
Pump runner	1	.55
Engineer	1	.55
Mechanic	1	.55
Locomotive engineers..	2	.50
Laborers	5	.45
Laborers	6-12	.40

Normally the working day consists of 9½ hours, five days per week, with 5½ hours on Saturdays, work being carried on continuously throughout the year.

SUMMARY OF COSTS IN UNITS OF LABOR, POWER AND SUPPLIES DURING AN AVERAGE MONTH

Labor (man-hours per ton)	
Stripping	$0.0215
Pumping	.06
Screening	.10
Loading	.05
Track repairs	.02
Drying	.10
Supervision	.036
General	.06
Percentage of total cost—59.	
Power and supplies	
Power, kw.h. per ton—	
Pumping	2.04
Wet screening	.163
Drying	3.43
Cost of other supplies in percentage of total cost—21.	
Power and supplies, percentage of total cost—41.	

OVERHEAD—WET PLANT

Depreciation	.08
Depletion	.013
Taxes	.01
Insurance	.017
Selling	.04
Miscellaneous overhead	.01
Total overhead	.17

Adding this overhead of $0.17 to the operating cost of wet sand, $0.346, we have a total of $0.516.

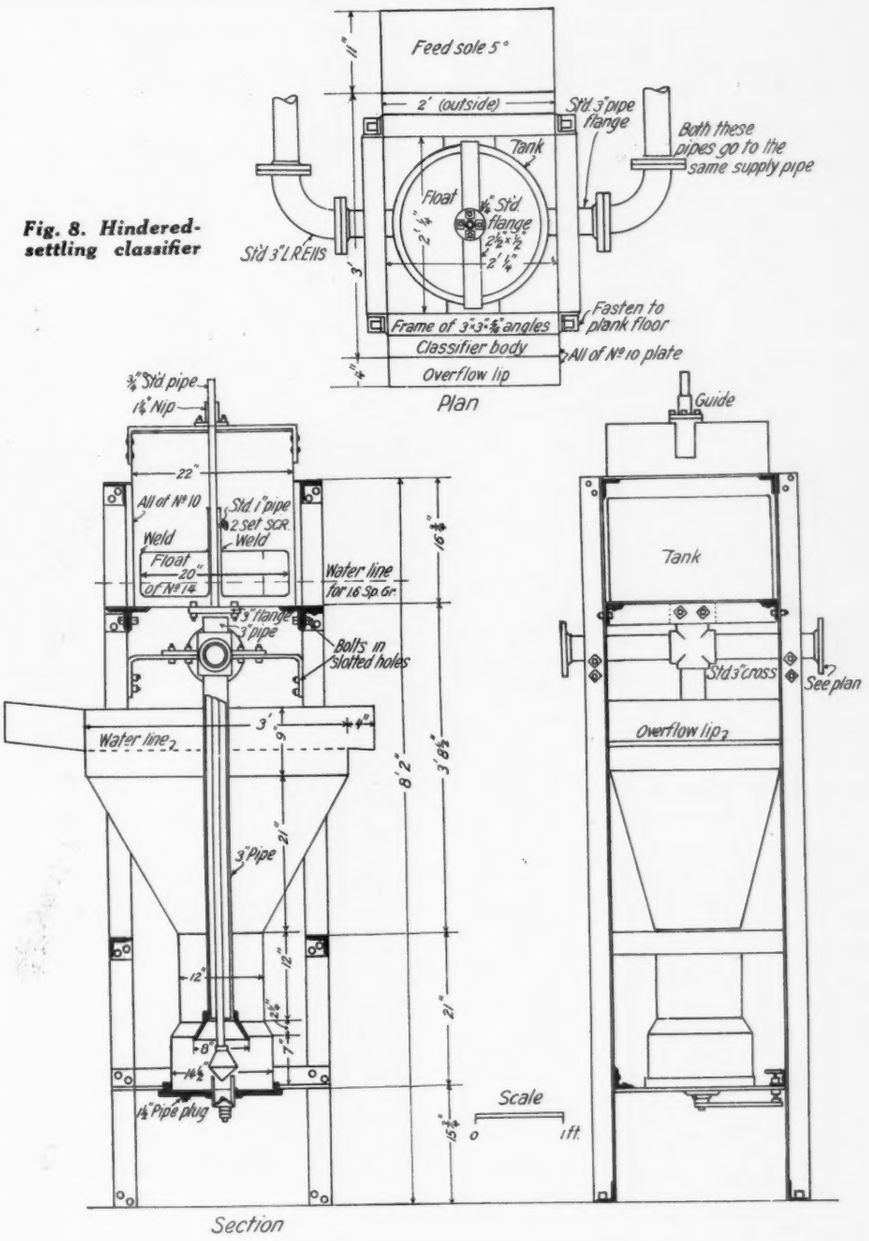


Fig. 8. Hindered-settling classifier

SUMMARY OF COSTS OF PRODUCING WET SAND, PER TON

Period covered: 1927. Tons, sand and gravel, produced: 210,000.

Operating costs	Labor	Superintendence	Power	Fuel	Other supplies	Total
Stripping by A-Frame derrick, casting overburden into pond	$0.008	$0.002		$0.001	$0.001	$0.012
Pumping and conveying	.031	.010	$0.074		.016	.131
Wet screening and loading	.089	.020	.003		.037	.149
Storage	.005			.003	.002	.010
Repairs and maintenance	.023				.004	.027
Miscellaneous expense	.013				.004	.017
Total operating cost of wet sand	$0.169	$0.032	$0.077	$0.004	$0.064	$0.346

DRY PLANT—SUMMARY OF COSTS

Period covered: 1927. Tons produced: 15,500.

Hauling	$0.037	$0.005			$0.062	$0.104
Drying	.226	.034	$0.130	$0.160	.112	.662
Screening	.158	.026			.054	.238
Loading	.057	.005	.010	.035	.027	.134
Miscellaneous plant	.020			.036		.056
Total operating cost dry plant	$0.498	$0.070	$0.140	$0.231	$0.255	$1.194
Cost of producing wet sand	.169	.032	.077	.004	.064	.346
Total operating cost	$0.667	$0.102	$0.217	$0.235	$0.319	$1.540

First Annual Convention of The National Ready-Mixed Concrete Association

THE FIRST ANNUAL CONVENTION of the newly formed National Ready-Mixed Concrete Association was held at Hotel Jefferson, St. Louis, Mo., January 26, 1931. It was a most satisfactory and interesting meeting with a much larger attendance than had been anticipated.

At the morning session, presided over by J. E. Burke, president, papers were read by A. T. Goldbeck of the National Crushed Stone Association; J. L. Shiely, of the J. L. Shiely Co., St. Paul, Minn.; Henry D. Johnson, Jr., of the Bureau of Bridges, Pittsburgh, Penn., and Stanton Walker of the National Sand and Gravel Association.

Correct Proportioning

A. T. Goldbeck, speaking on the subject, "Proportioning Concrete for Strength, Durability and Permeability," gave, in abstract, a practical working basis for the proportioning of concrete mixtures in the simplest possible manner for strength, workability and durability.

He brought out the fact that while the strength of concrete is affected chiefly by the water-cement ratio, it is also influenced by the character of the cement and of the aggregates, as well as by the temperature and character of the curing. While the strengths of almost all cements have been increased in recent years, tests show quite a variation in the strengths of different cements at 7 and 28 days with a less difference after a year or more, so that each producer should obtain water-cement ratio compressive strength curves for his particular cements.

As to the aggregates, both coarse and fine, the variations in moisture content, the cleanliness, variations in absorption, angularity, surface roughness and so forth, all affect the strength of the concrete. The gradation of the aggregates affects particularly the workability of the concrete, without having a great deal of effect on the strength, although it may affect the economy. Surface coatings, particularly some clay coatings, naturally affect the bond of the mortar with the aggregates and hence the strength.

The strength of concrete is increased by curing at high temperatures and reduced by low temperatures, which must be considered in the design, cold weather requiring a lower water-cement ratio than hot weather. The manner of curing also affects the strength as well as the permeability and hence the durability of the concrete.

Lantern slides and charts showed the importance of a low water-cement ratio in obtaining durability as well as strength, those samples of concrete made with high water-cement ratios showing much greater disintegration under the freezing and thawing tests than those samples having a low water-cement ratio. The water-cement ratios suggested by the Portland Cement Association for different climates and kinds of concrete were given, these ranging from 6 to 8 gal. per sack of cement.

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J. E. Burke

In explaining methods of designing mixes, Mr. Goldbeck demonstrated with charts the practical method of trial mixtures, using the water-cement ratio compressive strength curve, or the water-cement ratio modulus of rupture curve, as the case might be, to determine the necessary water-cement ratio for the required strength. After determining this the aggregate proportions are best found by trial mixes to get at the proper workability or consistency. The cement content per cu. yd. of moisture is determined by filling a ½ cu. ft. measure with the mixture and weighing. Knowing the weight of each ingredient and the weight of the concrete mixture the exact amount of each material may be obtained by proportion.

Safeguards for Producer

J. L. Shiely, on the subject "Suggested Strength Specifications," brought out the importance from a practical standpoint of considering carefully the type of contract entered into, in order to avoid later controversies.

In contracting with the customer he urged that there be a complete understanding as to where the producer's responsibility ends, because if concrete of a certain strength is to be furnished at a stipulated price then the matter of workability cannot be left open to the discretion of the individual foreman on the job, because of the relationship between water-cement ratio and strength.

The contract should provide for a certain slump at the delivery point, with a sliding scale of prices for other slumps, since adding water to increase the workability necessitates the addition of cement also, which increases the cost.

Mr. Shiely also stated that for his protection the producer should insist on proper test cylinders being taken at the delivery point and properly cured and broken according to A. S. T. M. standards, since carelessness in the making of test cylinders often results in lower test results than the concrete deserves and leads to controversy and damage claims. Because of this possible error due to the human element he believes further that contracts should have a general clause which would allow the average strength of all test cylinders to be considered as the strength.

He also stated that there must be no compromise as to quality, but that ready-mixed concrete standards must be of the highest, so that it will be accepted universally as best, and that such standards should be guaranteed and made part of the contract, the A. S. T. M. standards to be the basis for this quality and to enter into the specifications.

Safeguards for User

Henry D. Johnson, on the subject, "Pre-mixed Concrete from the Users' Standpoint," stated that to be successful a plant for the manufacture of pre-mixed concrete must have modern equipment and a trained and efficient personnel so that there may be no question as to the quality of the concrete, which must be kept high if this method is to replace the older method of mixing on

the job. He also considered that some method of payment which would protect the owner against inferior concrete is necessary, and urged bonding for that purpose so that the buyer may be indemnified where defective concrete would affect safety.

He suggested, however, that there be a certain tolerance allowed, as suggested by Mr. Walker, that 75% of the tests be within 20% of the average strength and not more than 5% fall below a predetermined minimum value; and believed that with good curing conditions this could safely be based on 7-day instead of 28-day strengths.

According to Mr. Johnson the city of Pittsburgh avoids controversy by a thorough inspection service of its own all the way through. Practically half of the contracts let use pre-mixed concrete either wholly or in part, while about one-fourth of the total concrete is pre-mixed, indicating that almost all of the small jobs are done in that way.

Pre-mixed concrete has been used for five years. The early specifications called for a 1:2:4 mix, with 6 gal. of water per sack of cement. This was hauled in open flat trucks, with considerable variation, the strengths ranging from 1300 lb. to 4100 lb. Then the calculation method was taken up using the fineness modulus, a water ratio of 0.8, with moisture content of the aggregates considered.

The present specifications are for 6 gal. of water per sack of cement, and not over 540 lb. of total aggregates per sack of cement with a two-minute mix. All materials including cement are weighed and the aggregates proportioned to give necessary strength, workability, etc., all mixes being determined by the trial batch method. Moisture tests are made 3 to 5 times daily. The above specification gives a 3000-lb. concrete. The amount of concrete or the yield checks within ½%.

Design of Mixes

Stanton Walker, on the subject, "Yield of Aggregates in the Design of Concrete," presented a simple and practical method of computing the quantities of materials required for a given volume of concrete. His paper will be published in full in a later issue of Rock Products.

While not new in any sense, the method was set forth with examples and specific computations in such a way as to make it easily understandable, and is based on the fact that the volume of freshly mixed concrete is equal to the sum of the volumes of solid aggregates, solid cement, water, entrained air and unfilled voids.

The volume of solids of each material entering into the concrete is determined by dividing the total weight of that material by the weight of a unit volume, that is, by the weight of a unit volume of water multiplied by the specific gravity of the material. Account is taken of the moisture in the aggregates and corrections made for it in the calculations.

Two problems convering different conditions were worked out in detail to show the quantities of both fine and coarse aggregates required to produce one cu. yd. of concrete.

An algebraic formula was also given for those preferring that method of solution, and a third approximate and more rapid method for rough estimates.

Luncheon

Following the morning session the delegates were the guests of the General Material Co., of St. Louis, at a luncheon in the Jefferson Hotel.

H. F. Thomson, in the absence of **A. C. Butterworth,** president of the General Material Co. acted as host.

At the afternoon session papers were presented by J. C. Eakin, Big Rock Stone and Construction Co., Little Rock, Ark.; R. B. Young, Toronto Ready-mix Concrete, Ltd., Toronto, Canada, and W. H. Whitten, the Warner Co., Philadelphia, Penn.

Average City Operation

J. C. Eakin described the operation of his plant, particularly the selling and service end, and stressed the importance of following through on service all the way to include not only the selling but the manufacture, delivery and placing of the concrete. His company has been making ready-mixed concrete for five years in a city of 100,000 population, and uses ten plain bath tub type trucks, not as yet having found any need for agitator type trucks.

He believes that in order to ensue quality concrete it is necessary to keep in close contact with the contractors and make sure that the concrete is not only being made and delivered properly but is also being placed in the forms in a proper manner. He stated that the trend is toward concrete of a given strength rather than a given proportion, and urged more effort toward selling the architect, engineer, contractor and user on the merits of ready-mixed concrete. His company uses advertising space in local building and trade papers, along with motion pictures portraying the manufacture and placing of concrete made in this way.

Canadian Operation

R. B. Young described particularly the way in which the ready-mix operations of his company are carried on at Toronto and Montreal. Several plants are operated, all less than three years old, and most of them less than two years old, using dry batchers and delivering in Transit mixer trucks. The batching bins are filled by both cranes and belt conveyors, but Mr. Young considers the latter method the most satisfactory. For winter operation the aggregate storage piles at Toronto are arranged with steam pipes so that live steam may be turned through the piles, and live steam is also used with the tunnel and belt conveyor system at Montreal. In the batching bins steam coils are used, so that the aggregates are kept up to a temperature of 90 or 100 deg.; 3 boiler hp. being required per yd. per hour. The mixing water is heated to about 130 deg., and no auxiliary heating has been found necessary on the trucks, delivery being made at a temperature of about 85 deg. The Transit trucks are equipped with two tanks, the auxiliary tank carrying 1 gal. of water per yard of concrete, but a careful check is kept on such extra water and if used it is noted on the report.

An outside inspection service is employed to test all materials and it has full responsibility for the mix. This arrangement has worked out very satisfactorily, giving the customer more confidence in the product and helping sales. Frequent tests are made and records kept, test cylinders being taken where delivered to the job.

Philadelphia Operation

W. H. Whitten described the Philadelphia operation, amounting to some 100,000 cu. yd. for street work and a total of about 474,000 cu. yd. last year. This was an increase from 175,000 cu. yd. in 1929. A volume of some 750,000 yd. is anticipated for 1931. According to Mr. Whitten about 60% of the total concrete used in the city is now of this type.

Complete technical control is maintained, an outside engineering concern being held responsible for plant methods and tests. Cement is tested at the mill and a field laboratory is installed at each plant, one inspector supervising the operation of each mixer. Hourly moisture tests are made. Four brands of cement are used with cement bins good for a full day's run. For concrete delivery 150 trucks are used, and cost records are kept on each truck.

For delivery purposes the city is divided into four districts, each under a street superintendent. The plants are arranged to minimize truck delays at the plants by having the roadways properly arranged so that there is no backing of trucks.

Power shovels are used for unloading bulk cement, which show an unloading cost of about ½c per bbl. of cement. A 150-hp. boiler is used for heating, per 150 yd. per hour output. The mixing costs are approximately 40 to 45c per cu. yd., with the delivery or haulage costs about 90c per cu. yd. for hauls of 3 to 3½ miles.

The spread or difference between the concrete and equivalent dry materials delivered is $1 per cu. yd.

An engineering service has been added to better inform the trade and the engineer, contractor and others as to the advantages of this method of making concrete. Some advertising is also done to further its use. Close contact is maintained on all jobs being furnished as it has been found that complaints of poor quality are often due to improper methods of handling and placing on the job.

General Discussion

At the general discussion following, quite a number of matters of general interest were brought up and discussed, among others ways and means of further co-operating with engineers and architects and variations in present testing methods. It was generally agreed that the present testing methods give results too much at variance to be satisfactory and that more care in preparing test cylinders is very desirable.

The experience of those present seemed to indicate that in the delivery of concrete in trucks there is a gain in strength proportional to the time, within limits.

Messrs. Ginsberg, Shields, and Young all urged attendance at the annual meeting of the American Concrete Institute to be held at Milwaukee February 24-26.

With the representation of different members on the A. S. T. M. and American Road Builders and American Concrete Institute committees it is anticipated that much good will result in improving methods and standards.

Arrangements were made with the National Sand and Gravel Association to permit Messrs. Ahearn, executive secretary, and Walker, director of engineering and research division, to act in a consulting capacity, and it is also expected that similar arrangements may be made with Mr. Goldbeck of the National Crushed Stone Association.

The convention was concluded with a banquet at Hotel Jefferson in the evening.

Officers Elected

The following officers were elected for the ensuing year: J. E. Burke, president; R. B. Young, Paul P. Bird and H. F. Thomson, vice-presidents; J. L. Shiely, treasurer; J. C. Eakin, secretary; Alexander Foster, Jr., delegate-at-large.

Registration

Producers

Arrow Sand and Gravel Co.—S. Stepanian, Columbus, Ohio.
Avril Tru-Batch Concrete, Inc.—Arthur C. Avril, Cincinnati, Ohio.
Big Rock Stone and Material Co.—John C. Eakin, Little Rock, Ark.
Boston Sand and Gravel Co.—Paul P. Bird, Boston, Mass.
Builders Material Co.—S. P. Moore, Cedar Rapids, Iowa.
Central Supply Co.—A. J. Wilson, Watsonville, Calif.
Certified Concrete Co.—B. S. Andrus, South St. Paul, Minn.
Cincinnati Builders Supply Co.—C. T. Warner, Cincinnati, Ohio.
Fort Worth Sand and Gravel Co.—M. E. Hart, Fort Worth, Tex.
General Material Co.—C. G. Fischer, Karl W. Lick, H. F. Thomson, Paul Thomson, St. Louis, Mo.
Hercules Cement Corp.—Herbert Coffman, Philadelphia, Penn.
Keefner Concrete Co.—Joe Keefner, John Keefner, Des Moines, Iowa.
Kent and Co.—Paul F. Kent, Champaign, Ill.
Kuhlman Builders Supply and Brick Co.—E. H. Kuhlman, Toledo, Ohio.
Land Construction Co.—M. O. Land, St. Joseph, Mo.
Lehigh Cement Co.—H. B. Emerson, Chicago, Ill.
McCrady-Rodgers Co.—Phil K. Rodgers, Pittsburgh, Penn.
Ready-Mixed Concrete Co.—Harold Blake, Portland, Ore.
Ready-Mixed Concrete Co.—J. E. Burke, Pittsburgh, Penn.
Ready-Mixed Concrete Co.—R. P. Lyons, Edward L. Schneider, Kansas City, Mo.
Ready-Mixed Concrete Corp.—R. J. Welsh, Minneapolis, Minn.
Fred Schmidt R. and T. Co., Inc.—T. H. Fleming, H. C. Thoene, St. Louis, Mo.
J. L. Shiely Co.—J. L. Shiely, St. Paul, Minn.
Superior Ready-Mixed Concrete Co.—Walter E. Howard, Cincinnati, Ohio.
Toronto Ready Mix Concrete Co.—R. B. Young, Toronto, Ont.
Universal Atlas Cement Co.—C. A. Downing, Jack W. Hussey, Andrew T. Smith, St. Louis, Mo.
Warner Co.—R. C. Collins, Nazareth, Penn.; Alexander Foster, Jr., Herbert Whitten, Philadelphia, Penn.

Others

American Manganese Steel Co.—A. W. Daniels, W. G. Nichols, Chicago, Ill.
Charles W. Barnes, Jr., City Hall, St. Louis, Mo.
Barnsdall Tripoli Co.—Warren C. Bruce, St. Louis Mo.
W. H. K. Bennett Co.—J. W. Meckenstock, Chicago, Ill.
C. G. Besch, St. Louis, Mo.
Blick Brick and Material Co.—W. H. Blick, Ferguson, Mo.
Blaw-Knox Co.—H. A. Camlin, J. V. Daniel, Chicago, Ill.; A. A. Levison, Pittsburgh, Penn.
Buffalo Gravel Corp.—R. W. Eberley, D. Hyman, Buffalo, N. Y.
Butler Bin Co.—Frank I. Ginsberg, New York City; A. R. Morton, Waukesha, Wis.
Central Building Material Co.—George Ratermann, St. Louis, Mo.
Chain Belt Co.—Charles F. Ball, J. F. Hacker, A. E. Miller, Milwaukee, Wis.
D. L. Chaney, 1313 Syndicate Trust Bldg., St. Louis, Mo.
Clinton Motors Corp.—George M. Bunn, Reading, Penn.
"Concrete"—Norman M. Stineman, Chicago, Ill.
Construction Materials Corp.—R. C. Yeoman, Chicago, Ill.
J. K. Davison and Bro.—H. S. Davison, H. H. Stewart, Pittsburgh, Penn.
Dravo Contracting Co.—D. B. Newton, Pittsburgh, Penn.
Leonard Essig, City Hall, St. Louis, Mo.
Fuller Co.—J. M. Alonso, Chicago, Ill.
Good Roads Machinery Co.—Jack M. Bishop, Edwin C. Brown, Kennett Square, Penn.
Grand Rapids Gravel Co.—Dewey D. Battjes, Grand Rapids, Mich.
George C. Gundlach, Board of Public Service, St. Louis, Mo.
Heltzel Steel F. and I. Co.—R. R. McBride, Warren, Ohio.
Hendrick Manufacturing Co.—B. G. Shotton, Pittsburgh, Penn.
Hug Co.—R. A. Bliss, C. J. Hug, R. K. Tibbetts, Highland, Ill.
Jaeger Machine Co.—H. L. Bachman, Columbus, Mo.; C. C. Riordan, Chicago, Ill.; George F. Smith, St. Louis, Mo.
Johns-Manville Co.—George Conahey, New York City.
Henry D. Johnson, Jr., City of Pittsburgh, Penn.
Landers-Morrison-Christianson Co. — Charles H. Young, Minneapolis, Minn.
Latin-American Press Association—F. B. Acosta, Washington, D. C.
Link-Belt Co.—C. S. Huntington, A. K. Schiffiin, Chicago, Ill.
Marion Steam Shovel Co.—E. R. Wilson, Marion, Ohio.
Marquette Cement Manufacturing Co.—Harry Shields, Chicago, Ill.
Michigan Gravel Co.—Ezra Sensibar, Saginaw, Mich.
Missouri Portland Cement Co.—Joseph N. Baggot, Geoff A. Saeger, St. Louis, Mo.
National Crushed Stone Association—J. R. Boyd, A. T. Goldbeck, Washington, D. C., W. F. Wise, Dallas, Tex.
National Equipment Co.—H. B. Jones, Milwaukee, Wis.; C. F. Rabbeitt, St. Louis, Mo.
National Sand and Gravel Association—D. D. McGuire, Webster Grove, Mo.; C. E. Proudley, Washington, D. C.
Neff and Fry Co.—E. N. Heim, Camden, Ohio.
H. E. Nelch, Springfield, Ill.
M. A. Neville, Lafayette, Ind.
Northwest Engineering Co.—H. A. Hutchins, Chicago, Ill.
Ohio River Sand Co.—J. M. Settle, Louisville, Ky.
Victor L. Phillips Co.—Ward R. McGavren, W. R. Wilson, Kansas City, Mo.
"Pit and Quarry"—Mat F. Beisber, S. A. Phillips, Chicago, Ill.
Pittsburgh Testing Laboratory—W. G. Clark, St. Louis, Mo.; H. H. Holmes, Chicago, Ill.
Portland Cement Association—H. E. Freeh, St. Louis, Mo.
John E. Powers, City Hall. St. Louis, Mo.
C. F. Rabbeitt, Inc.—Art Driscoll, St. Louis, Mo.
Ransone Concrete Machinery Co.—H. C. Peters, Oak Park, Ill.
ROCK PRODUCTS—Earl C. Harsh, Chicago, Ill.
St. Louis Industrial Bureau—George C. Smith, St. Louis, Mo.
St. Louis Material Supply Co.—Edwin H. Conrades, St. Louis, Mo.
H. S. Shifrin, City Hall, St. Louis, Mo.
Vincent Schroeder, 4964 Maffit Place, St. Louis, Mo.
Seaboard Sand and Gravel Corp.—Harold T. Smith, New York City.
Simplicity Engineering Co.—F. D. Barber, Fred Buell, Durand, Mich.; Roy Dunckel, Columbus, Mo.; C. W. Hardner, Louisville, Ky.; J. B. Gower, Chicago, Ill.; E. H. Martin, Toledo, Ohio.
George F. Smith Co.—P. J. Hambrough, St. Louis, Mo.
Stephens-Adamson Manufacturing Co.—C. H. Adamson, M. A. Kendall, C. A. Krause, E. J. Patton, Aurora, Ill.
Stewart Sand and Material Co.—John Prince, Kansas City, Mo.
Toledo Scale Co.—H. C. Mathias, Toledo, Ohio.
Transit Mixers, Inc.—Edwin F. Hill, Jr., San Francisco, Calif.
W. G. Traver Supply Co.—S. P. Helpinstine, W. G. Traver, Decatur, Ill.
Union Sand and Gravel Co.—J. L. Richmond, Huntington, W. Va.
Vaso Manufacturing Co.—Carl L. Leon, Seattle, Wash.
Western Pennsylvania Sand and Gravel Association—Ray V. Warren, Pittsburgh, Penn.

Organize Ready-Mix Firm for Vancouver

COL. C. E. REYNOLDS, president and general manager of Toronto Ready-Mix Concrete, Ltd., and the Ready-Mix Concrete Co. of Montreal, who was a recent visitor to Vancouver, announced, prior to his return to Toronto, that his principals in the east are planning the purchase of the business of B. C. Contractors' Supply Co., Ltd., Granville Island, and to assume control early this spring.

The final details of the transaction are expected to be completed immediately in the east and arrangements made to meet the local demand for ready mixed concrete services.

The business of the firm in the east has been growing rapidly, Colonel Reynolds reported, and six plants are now in operation, two at Toronto, one at Ottawa, one at Niagara Falls and two under the aegis of the Montreal subsidiary. Forty-eight truck mixers are now operating in the eastern field, he stated, and this number will be increased by 30 in the coming spring to meet ever increasing demands.—*Vancouver Jour. Com. & Bldg. Record.*

Bridgeport Ready-Mixed Concrete Company Organized

THE CITY LUMBER CO., Hannan Lumber Co., Schwarz Bros. Co., and Frank Miller Lumber Co., operating retail lumber yards in Bridgeport, Conn., have combined with five other Bridgeport concerns in the organization of a $100,000 enterprise, named the Bridgeport Concrete Co., under the management of John Schwarz as president.

These concerns have co-operated in the construction of a mammoth concrete mixing plant capable of supplying wet concrete of any degree and strength, thickness and grade, for immediate delivery to the job, whether a home, factory building, or a sidewalk.—*American Lumberman.*

National Slate Association Elects Officers

Industry Faces Many Difficult Problems

By a Special Correspondent

W. A. LeSUEUR, president of the LeSueur-Richmond Slate Corp. of Richmond, Va., was elected president of the National Slate Association at its annual meeting held in New York City, January 20. W. S. Hays of Philadelphia, who has served the association faithfully since its inception in 1922, was re-elected secretary, R. B. Lewis was elected treasurer.

To increase the effectiveness of the organization, six vice-presidents were elected, one to represent each of the slate districts other than the district represented by the president. Following are the vice-presidents of the respective districts: E. R. Norton, Granville, N. Y.; R. D. Griffith, Fair Haven, Vt.; John W. Coleman, Monson, Me.; R. D. Chapman, the hard vein district of Pennsylvania.; Wm. A. Kitto, Pen Argyl and Bangor, Penn.; A. M. Jones, Slatington, Penn.

The following members constitute the board of directors: A. H. Morrow, L. Renton Brown, H. G. Williams, J. O'Brien, Wm. H. Smith, Harry Stoddard, John Williams, Elwood Doney, Hayden Owens, R. Jackson, 3rd, S. J. Spry, F. C. Sheldon. G. H. Shinville, N. M. Male and H. D Hicks.

The new president, W. A. LeSueur, has been prominent in the National Slate Association for several years, serving as director and vice-president. He represents the well-known Buckingham county slate area of Virginia, which has produced large quantities of high-grade roofing slate for many years.

Slate Industry Faces Severe Depression

The newly elected officers face a condition of serious stagnation in the industry. Preliminary figures submitted by operators to the Bureau of Mines indicate that there was an approximate decrease of 33% in both quantity and value of slate production in 1930 as compared with 1929. Every branch of the industry shared in this decrease, though roofing slate, particularly in Vermont and Pennsylvania, suffered the greatest depression in unit values as well as in quantity sold. The striking decrease in residential building has been particularly instrumental in retarding sales of roofing slate.

Producers Face the Future Courageously

The gathering held at the Yale Club in New York City on January 19 and 20 was three-fold in character, for it combined the annual meeting of the National Slate Association, a meeting of Committee D-16 on Slate of the American Society for Testing Materials, and a conference sponsored by representatives of the Federal Specifications Board from Washington, D. C.

Though the slate producing industry is passing through difficult times, it is encouraging to find a growing activity in research, an increasing determination to improve and standardize products, and an aggressive movement toward widening the field of usefulness of this adaptable natural product. The record following indicates clearly that stagnation in sales is reflected in no diminution of effort toward improving conditions in the industry.

Meeting of Committee D-16

As in several previous years, Committee D-16 of the American Society for Testing Materials combined its meeting with the regular technical session of the National Slate Association. The session, which was open to all slate producers, met at 10 o'clock on January 19 and was presided over by Chairman W. B. Plank of Lafayette College, ably assisted by Secretary D. Knickerbacker Boyd of the Structural Service Bureau in Philadelphia. About 40 members and guests were present. The session was devoted chiefly to reports of the various sub-committees. Daniel W. Kessler of the U. S. Bureau of Standards, reporting for sub-committee 1 on "Methods of Tests," pointed out certain desirable changes in the method of testing the ratio of absorption, and of determining the modulus of rupture of slate. These tentative methods were advanced nearer the point of acceptance as fixed standards.

Drum Sanders Revolutionize Slate Milling

Most of the session was devoted to discussion of the report of the committee on "Machining and Workability" as presented by Dr. Oliver Bowles of the U. S. Bureau of Mines. Attention was first directed to the remarkable progress made by the Monson (Maine) Slate Co. in the use of drum sanders for finishing electrical slate. Frank H. Rudy, representing the company, gave considerable detail of the process. As a result of two years devoted to research, a three-drum sander is now in successful use. The drums are covered with spirally wound paper—backed sand paper—the grits being successively finer, a 40 grit on the first, 60 on the second and 100 or 120 grit on the third. The slate passes beneath the drums carried on a traveling rubber bed. The rate of finishing slate has been increased remarkably. A speed of 18 in. per min. by former methods has been increased to 28 ft. per min.; or, measuring its efficiency in another way, as much work is accomplished by two men in 7 min. using this equipment as was formerly accomplished by four men in 1 hour. The equipment may be extended to cover earlier stages of slate milling. Most of the Monson production is used for high-grade electrical panels and switchboards requiring a high finish.

Diamond Saw Successful in Cutting Slate

The Chapman Slate Co. at Chapman's Quarries, Penn., has been using diamond circular saws for nearly a year in sawing blocks for roofing slate manufacture. The quarries are situated on what is known as the "hard vein," the rock being too hard to be cut successfully with the ordinary steel-toothed saw. The saw now in use is 48 in. in diameter with 60 black diamonds set in the edge. The saw is mounted on traveling head which advances with a variable-speed worm-gear. The block of slate is mounted on a car beneath the saw, and when a cut is finished a very short time is required to shift the car to proper position for a second cut. Two streams of water are directed on the cutting edge. Richard (Dick) Chapman kindly supplied the following information regarding its operation and advantages. It costs about $600 a month to operate, which amount includes power, labor, saw replacements and repairs, and averages about 24 c. per square of slate made. A considerable saving of raw material results. It is estimated that 15 to 20% more squares of slate are made from a given tonnage of blocks than would be made from the same tonnage unsawed. This is because it permits the use of material that would be otherwise wasted. The mill capacity is also increased 15 to 20%. It saws at the rate of 3 to 8 in. per min. on slate 12 in. thick, the rate depending on the hardness of the slate. Sufficient experience has not yet been gained to decide certain points, such as the best saw diameter, the proper blade thickness and the most suitable sawing speed. Wire-sawing the slate in the quarry is more economical than cutting with the diamond saw, therefore the quarry process is modified to minimize diamond sawing as much as possible.

F. C. Sheldon reported that gang saws using steel shot as abrasive are being used successfully in Vermont. They are of particular advantage in certain grades of slate that do much damage to circular saws.

An extremely hard alloy, tungsten carbide, is being used to tip the teeth of circular saws. A very fast rate of cutting has been

obtained, and further experiments are being conducted in co-operation with Henry Disston and Sons, Inc., of Philadelphia, manufacturers of many types of saws. One objective is to develop a device which will automatically slow up the rate of travel of the saw bed when a hard ribbon or knot is encountered.

Sand and Slime Cones in Successful Use

A type of equipment entirely new to the slate industry has been introduced by the Keenan Structural Slate Co. at Pen Argyl, Penn. A 3- ft. 6-in. Allen sand cone and a 6-ft. Allen slime cone have been installed. Sand and water from the rubbing beds, blackboard recut saws and carborundum machines are pumped from the two mills to the sand cone, the overflow of which is conveyed to the slime cone. Cars on a narrow-gage track beneath the cones carry the recovered sand back to the mills for further use, and carry the slime or muck to the waste dump. The equipment was set up and operated in an experimental way during the spring and early summer of 1930. The various adjustments necessary for new machines were made until satisfactory service was attained. During the summer, however, the water supply was so reduced on account of the drought that use of the cones was discontinued. Therefore no definite figures have been assembled for the cost of operation or the saving accomplished. The cones have two great advantages; much sand that would otherwise be wasted is saved for reuse, and the mud or slime, consisting of fine sand and slate cuttings, is removed from the overflow water. The latter is of advantage, not because of any intrinsic value in the mud, but because its removal overcomes a stream pollution difficulty that has caused much trouble in some localities.

Wire Sawing in Mills Is Advocated

W. S. Mershon, Cleveland representative of the Structural Slate Co., presented some interesting possibilities in the milling of slate. He proposed that wire saws be used, not only for cutting blocks of slate in directions of rift and hard way, but even in the direction of slaty cleavage in those structural slates that have a poorly developed or crooked split. He pointed out that accuracy in size with a tolerance of not more than 1/16 in. could be accomplished, and the wire cut surface would be so smooth that the rubbing bed operation might be omitted. A sandstone mill in Ohio is reported as having attained a very high degree of efficiency in the use of wire saws. He also advocated the desirability of gaging the size of quarry blocks to conform as nearly as possible to the requirements of the finished products, for in this way much waste could be eliminated. The use of the wire saw has done much to bring about a regular systematic removal of blocks from successive benches, but more could be accomplished in a determination of the most desirable block dimensions. In some quarries the presence of ribbons complicates any attempt at mathematical precision in the selection of sizes.

Federal Specifications for Roofing Slate

The afternoon session was devoted to consideration of a specification for roofing slate that has been in preparation for nearly two years by the Federal Specifications Board of Washington, D. C. The committee was represented by G. W. Ginder of the supervising architect's office, chairman, and by a subcommittee to whom the duty of framing the specification had been delegated. This subcommittee consisted of D. W. Kessler of the Bureau of Standards, H. A. Stacey of the Bureau of Yards and Docks of the Navy Department and Oliver Bowles of the Bureau of Mines. Many tests of slate have been made to determine its service in use, and to formulate a ready means of testing its quality. Much progress has been made in determining means of classing slate into three grades. It is a difficult matter to frame a specification that will not work a hardship on producers yet will enable purchasers to secure a slate upon which they can depend as suitable for the service demanded of it. A tentative standard has been devised, however, though many tests may be required before the limits of the grades can be fixed in any permanent form. It may be found necessary to modify the procedure.

A three-hour discussion brought out many important points concerning the application of this new system of grading to various individual slates. Tentative acceptance of the standard was voted with the understanding that it be submitted to the industry for exhaustive tests, and for reconsideration and possible modification if the test data accumulated should justify such action.

Annual Meeting of Association

The annual business meeting of the National Slate Association was held at the Yale Club, January 20, with President Wm. A. Smith of Bangor, Penn., in the chair. The traffic representative reported considerable progress in attaining more favorable freight rates on slate to southern territory, and on sand rates from eastern points to the slate districts. Many problems concerning freight and transportation were considered.

President's Address

President Smith presented in a brief address a condensed summary of conditions now existing in the industry. His picture of conditions was not a pleasant one, for it portrayed decreasing sales and drastic price cutting to levels below the cost of production. In his judgment conditions are so serious as to demand immediate and active steps toward establishing better sales methods. Though the undesirable facts were bluntly presented, the president's statements were generally applauded, for producers realized their truth and recognized the need for constructive action.

After the report of the nominating committee and election of the officers enumerated in the introductory part of this report, President LeSueur was escorted to the chair. The retiring president, Wm. A. Smith, was presented with a lounging robe and slippers in recognition of his services.

The secretary's and treasurer's reports were presented by W. S. Hays. He pointed out the urgent need for better financial support. The secretary's office is supplying the members with a variety of services that would cost them individually many times the price of membership in the association. Promotional and advertising work, though confined to a very modest scope, are reaping a rich harvest. Much of the secretary's activity is educational in character and therefore serves the industry in ways that are hard to measure definitely in dollars and cents, but nevertheless they build up good will and recognition, and they develop and retain business. His promotional work includes the following up of plans and specifications, and exhibiting admirable slate installations to architects and roofers. Recognizing that this machinery is organized and ready to continue its valuable service if properly supported, the individual members of the association present voted to render the financial assistance necessary to maintain its present activities in a modest way.

Considerable discussion was devoted to the establishment of more unified sales methods. The change in the organization, which involves the election of a vice-president for each slate district will, it is believed, assist in working out the sales problems, for these problems vary in the different regions. Each district is thus provided with the leadership necessary to correlate the varying factors and establish an active, aggressive, harmonious and unified sales organization.

It is recognized that the slump in slate sales is quite in line with the general business depression, but the greatest anxiety has to do with the chaotic condition of prices. To regain its former stability and to increase that stability is a difficult task, but the industry is confident that it has the leadership which will insure success.

Hope to Raise Funds to Operate Cement Plant

THE HOPE THAT enough money could be raised to start operation of the National Portland Cement Co.'s plant in California through sale of more stock was expressed in letters to stockholders in the company.

The plant now is ready for operation, according to President C. W. Boon of Tyler, Tex.

Mr. Boon advised stockholders that E. S. Gates, who sold thousands of dollars worth of the stock in El Paso, is attempting to sell $15,000 more to get money for payrolls and to start operation—*El Paso* (Tex.) *Post.*

National Crushed Stone Association Urges Revision of Anti-Trust Laws

St. Louis Convention of the Industry, January 19-22, Elects Albert L. Worthen of Connecticut, President

THE NATIONAL CRUSHED STONE ASSOCIATION, at its 14th annual convention in St. Louis during the week of January 19, is the first organization in the rock products industry, so far as we know, to put itself definitely on record in regard to President Hoover's recommendation in his annual message to Congress, that a Congressional inqury be made into the working of the federal anti-trust laws.

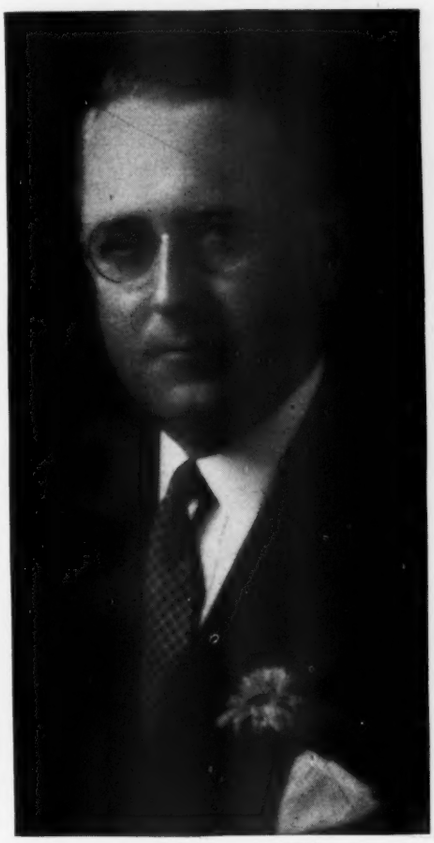
The convention adopted the following resolution:

"The National Crushed Stone Association in its 14th annual convention assembled at St. Louis, Mo., during the week of January 19, 1931, wishes to express its deep interest in the recommendation by President Hoover in his message to Congress of December 3, 1930, of a Congressional inquiry into the workings of the Federal Anti-Trust Laws and to record its hope that Congress will give to this vital question its earnest consideration, with a view to making such amendment of those laws, as while observing always the interest of the people of the nation in the preservation of conditions of adequate competition, shall recognize the right of industry to take reasonable co-operative steps to protect itself against the evils of destructive competition in times when shrinking markets lead into a condition of over-production."

The St. Louis convention was out of the ordinary in other respects. With a registration of over 600, it was the largest convention of the industry by at least 10%, notwithstanding the fact that we have just passed through a year of comparative depression, and the anticipation was that on this account the convention might possibly fall below the previous one in attendance.

This convention was extraordinary in the amount and quality of entertainment, provided in this case wholly at the expense of the St. Louis Quarrymen's Association and the Illinois Powder Manufacturing Co., under the very able direction of E. J. Krause, president of the Columbia Quarry Co., St. Louis, and past-president of the association; Col. E. J. McMahon, executive secretary of the St. Louis Quarrymen's Association, and C. W. Swanson, sales manager of the Illinois Powder Manufacturing Co.

The quality and variety of the convention program was such as to prove a real education to those who conscientiously attended the various sessions. There was instruction and food for thought in a variety of subjects—how to win an argument, a philosophical discussion of the proration of production, and on the theory and practice of taxation. Obviously, with



Albert L. Worthen, elected president of N. C. S. A.

such a program and the limited amount of space available for a report of the convention, we can merely touch upon some of the high points, and in doing this we will follow a subject outline and not a chronological arrangement.

Some of the High Points

Impressions that stand out most in the minds of ROCK PRODUCTS' editors are these:

Stone is no longer merely something that comes out of quarry for which customers place orders. Both individually and co-operatively, through their Association's research laboratory, the producers must seek to serve the special needs of a customer, and those needs are constantly changing and becoming more and more exacting.

Customers may be gained or lost by the method of approach of the salesman in presenting his arguments, and in spite of all the strategy of salesmanship, there is no substitute for a thorough knowledge of and familiarization with his product on the part of the salesman.

New customers may be made and production increased through the producers' aiding in the promotion of sound methods of construction and finance, specifically in the building up of a secondary road system which offers the largest possibilities for an expansion of markets during the next few years.

It was evident to one who listened carefully that there is every reason to believe that markets for crushed stone and ground agricultural limestone in the great majority of cases are continuing or self-perpetuating markets. For example, more lime is carried into solution in our rivers and into the seas annually, due to the erosion of soils, than is added in the form of ground limestone and lime. Again, in the case of railroad ballast, the annual requirement of new stone on rock-ballasted track amounts to about 3% of the amount originally required to ballast the track, notwithstanding all the modern methods of periodically cleaning the ballast.

Secondary road construction, according to speakers at this convention, such as light treatments of asphalt-bound stone, requires additional increments of stone yearly, so that the initial application is but a beginning of the pavement thus created. In the case of main arterial highways, paved with more permanent types of surfacing, the last two or three years have proved the ever-insistent demand for widening these pavements, also making a continuing market, so far as anyone can now foresee.

Business Conditions

As usual, the larger part of one session of the convention was devoted to reports by directors of the association on business conditions of 1930 and the prospects for 1931, in their respective territories.

Before quoting these, it might be said by way of summary, in general they verified very closely the digest of conditions in the January 3 Annual Review Issue of Rock Products. In the large producing territory in the Northeast, that is, east of the Mississippi river and north of Virginia and Kentucky, the reduction of ballast and flux stone business made a severe dent in what would otherwise have been a normal year. On the other hand, highway and municipal work was about as good as and in some instances better than in 1929, except in a few special localities such as the Chicago district, where everything was abnormally low.

Prices were generally below those of 1929, and everywhere special efforts were made to cut costs, with, however, wage reductions the exception rather than otherwise. Buyers in general took advantage of their position to make more rigid enforcement of specifications, and this resulted in the installation of considerable new equipment which was not needed for any increase in production.

The outlook for 1931 presented will make it apparently as much of a struggle for most of these producers as it is to some of the rest of us, but with very few exceptions they predicted a year at least as good as 1930 and, in some instances, appreciably better.

From reports of exhibitors in the Manufacturers' Division, it would appear that more than the usual interest was shown in the exhibits at this convention and that there appears to be at least a normal year in prospect for the equipment manufacturers in the industry. We think this is the result of more rigid specifications and an increasing desire for the utmost economy of operation rather than any expectation of an increase in production.

As perhaps at no other convention, everyone left with a feeling of better acquaintance with some of the fundamental problems of the industry, of economics and of the elements of good management.

Directors' Reports

W. M. Andrews (Youngstown, Ohio): Western Pennsylvania had a rather peculiar season during 1930 in that some sections had very fair business in the commercial line, while in other localities it was one of the poorest seasons in many years. This was due largely to slag competition. As an example of this, I would like to state that of the state highway lettings during the first three months of the year, approximately 85% were slag option in the western end of the state. Later lettings, however, somewhat righted this situation. Fortunately, the fluxing stone business did not start to decline until about the middle of the year, but from that time on it fell off very rapidly, until it reached the lowest point in December. In over 22 years of experience I have never seen this line so low, as out of 34 blast furnaces in the Mahoning and Shenango valleys only three were in blast at the end of the year. Fortunately, this situation is beginning to right itself and we are looking for a gradual increase throughout the year.

Outline of Convention Reports

1. ***BUSINESS CONDITIONS—Reports of directors — Survey of construction outlook, by Thomas S. Holden, vice-president, F. W. Dodge Corp.***
2. ***SALES AND PROMOTION—How to win an argument—Popularizing industry—Sales argument for bituminous type roads—The market for secondary roads—The market for ballast stone; stone for sewage treatment plants; for ready-mixed concrete; for agricultural limestone.***
3. ***SPECIFIC EXAMPLES of sales management — Management of credit—Local association methods of sales promotion.***
4. ***PRODUCTION — Standardization of equipment and supplies —Crusher bearing problems—Selection of electric motors—Standardization of product—Prevention of segregation in handling.***
5. ***MANAGEMENT—Responsibility of—Mental self-discpline and how to handle others through an understanding of psychology—Uniform cost-keeping—Accident prevention.***
6. ***RESEARCH—In concrete; responsibility of producers to do their share—Work and projects of the association.***
7. ***ECONOMICS—Proration of production to limit excessive wastes; its legal phases and considerations—Trade practice rules and their interpretation —Taxation—Principles of railway rate-making.***
8. ***CONVENTION BUSINESS—New officers and directors—Resolutions — Exhibit — Registration.***

H. E. Bair (Toledo, Ohio): A survey of conditions in this district, during the year 1930, shows that the consumption of railway ballast was about 40% of normal. Building construction was greatly reduced. The amount of road and street construction increased. The chemical markets showed a distinct falling off in consumption the latter part of the year. There was a general reduction in average prices for all purposes, due to an overproduction. In the production end there were drastic cuts in overhead and increased operating efficiency, made necessary by existing conditions and falling off in tonnage demand and lowered prices. Financial returns on investments were not satisfactory. The ballast outlook is no better than 1930. Chemical stone the first half will probably not exceed the low level reached in 1930, with prospects of the latter half showing signs of improvement. Building construction has not yet reached its lowest level. Road construction, maintenance and repair will not exceed that of 1930. There is a general outlook for further reduced consumption in all markets during 1931. In the production end, further reductions in operating costs are not possible to offset continued loss in tonnage and price. Most of the inefficiency that has crept into the industry over the past few years has been eliminated.

L. J. Boxley (Roanoke, Va.): Commercial sales for 1930 in our district were slightly in excess of those for 1929 as to tonnage, but the income from them was less on account of a reduction in unit price as well as the increased cost of selling, and also the more literal and rigid interpretation of specifications as to sizing and consequent additional cost incident thereto. There was a slight reduction in the tonnage of railroad ballast for 1930 compared with 1929, but taking it altogether, and in view of the depression in 1930, we feel that we had a very satisfactory year. As to the outlook for 1931, from advance reports the state road-building program seems to be on a larger scale than it was for 1930. The cities in our vicinity also seem to have larger street and sewer building budgets than for the year 1930. However, we do not expect a material increase, if any, in the tonnage of railroad ballast, due to the decrease in the earnings of the carriers.

C. D. Brewer (Duluth, Minn.): I can make a very short report about the Duluth Crushed Stone Co. We enjoyed a little more business in 1930 than in 1929, but that was not in line with what we are accustomed to enjoying. The year 1931 looks as though it would be equal to 1930. Then I have two letters which came from my territory up there. They are rather short.

The first one is from the Quartzite Quarries, Inc., Luverne, Minn.:

"Answering yours of the 19th, our personal opinions of the prospects of 1931 are that it will probably be one of the best years for the quarry business that has been experienced for some time.

"The Sioux Falls, Dell Rapids, and Spencer plants have, if reports reaching us are true, a full season's run. This, along with our prospective business, will give a full season's run."

That is encouraging to other Minnesota men. The other letter is from Quinn Stone and Ore Co., Ltd., with head office in Duluth, but with a plant located at Fort William, Ontario. It says:

"Replying to your letter of December 19, there is not very much to be said for the crushed stone business tributary to our plant at Fort William for the season of 1930.

"The railroads continued their plan of curtailment and their use of crushed stone for ballast was limited. Local paving and road work required some material, as well as a comparatively small amount of elevator construction work.

"My understanding is that substantial road contracts have been let, both east and west of Port Arthur and Fort William, and which are to start early in 1931, and for which a substantial amount of crushed stone will be required. It is also reported that elevator construction work for the coming year will substantially exceed that of the past. There probably will be the usual amount of paving and sidewalk work. In addition to the above, at least one of the railroads in that territory plans very extensive changes to be started early in 1931 and carried on throughout the year, which will require a large amount of fill material and crushed stone."

L. R. Cartwright (Indianapolis, Ind.): The crushed stone business in central Indiana and eastern Illinois, like most other business in 1930, has been more or less hectic. Aside from shortage in agricultural limestone, caused largely by drought conditions, tonnage has been not far from normal. Increased gravel competition and a general disposition to cut commodity prices have, however, materially reduced average selling prices in most localities. While it is not pleasant to contemplate a narrowing margin between cost of production and net selling price, I am very confident the experience of 1930 has been most profitable to the crushed stone industry. We have all been driven to analyze costs more carefully. In many instances they have been reduced. In other cases we have found that certain operations carry costs which demand their modification. A few years ago the writer came before the convention with an urgent plea that we get behind a movement to reduce accidents in the quarry industry. A tangible result which our company has enjoyed from the activity of the association in this direction is that two of our plants operated last year without a lost-time accident. My recommendation now is that this organization interest itself in a uniform system of cost accounting. This does not necessarily mean turning over all our figures to a central clearing house. But a uniform system of determining costs is going to have two wholesome effects. First, a careful analysis will open our eyes to what our costs really are, and stimulate plans for their reduction. Second, a standardized system of cost accounting is sure to reflect itself in a better standardization of selling prices. These ends will justify a lot of work on the part of members of our association. While we may not look with complete satisfaction on a year such as the one just closed, if we have learned what we should in 1930, business in 1931 will be better.

Col. O. P. Chamberlain (Chicago, Ill.): I have headed by report, "Report on Business Conditions in the Chicago District." We were kept so busy in the Chicago district with competition that I only got a very cursory glance at conditions elsewhere, although conditions were not dissimilar throughout Illinois from what they were in the Chicago district. There was a general falling off of business and a very small demand compared to previous years. The production of crushed stone in the Chicago district during 1930 was about 70% of the volume produced in 1929, amounting to approximately 3,400,000 cu. ft. of crushed stone. The latest information I have in Chicago is that the falling off was 76% in Chicago, but of course we serve a district within a radius of 100 miles from Chicago. The importation from other points, particularly from Sturgeon Bay, Wis., has increased and interfered seriously with the business of the Chicago quarries. The down trend of prices which was so noticeable in 1928 and 1929 became acute in 1930. Stone was marketed at the lowest average price since 1920. It is almost a certainty that 50% of the stone produced in the Chicago district in 1930 was marketed at no profit, some of it at a slight loss. I want to give one instance. There was just one large building constructed in the business district of Chicago last year. It was started and practically completed within a year. That was not an entire building, but it was large enough for a pretty good-sized building. That was the Morrison Hotel. It went to gravel and sand, not crushed stone. It was shipped in on a freight rate of 65c a ton, 97½c a yard, and was delivered on the job by truck at $1.40 a yard. You can do your own figuring as to what profits the dealer got. I can remember when if we got $2.25 we thought we hit bottom. Few of the plants run over eight hours per day during any of the producing periods, and during a large portion of that period they cut their production by running either shorter hours per day or only four or five days per week. There appears to be nothing in the outlook for 1931 to encourage our stone producers. With a prospective light production, together with an almost certain low selling price, the outlook is far from cheerful. Perhaps we should modify that a little bit in regard to the activity now. The World's Fair should produce some business. There is also the old story of the tunnel or the subway. They started to build subways on paper when I came to Chicago in 1904, and they are still at it—on paper. To tell you of the condition in Chicago, I want to quote a word from the *Chicago Tribune*, from one of its special writers: "Chicago had the highest record of building construction during the last decade, a total of $72,016,400, comparable only to that of 1920, $79,126,500." We got back where we were ten years ago, as far as building construction is concerned. In the interim, taking the building permits as a guide, we had four very good years, 1925, 1926, 1927 and 1928, reaching a peak in 1926, when the volume of this building construction was $369,700,000. It fell away pretty rapidly in 1929, when it was $200,300,000. Then it dropped back to $79,600,000. So from the peak year 1926 we had a falling off of building construction of 80%. It is 20% of what it was in 1926. That is a condition that is hard to understand, but it is a fact. The office buildings in Chicago are all hunting tenants. I will give you a concrete example of something I know, because it was my own office. Our lease expired this year. After being visited by probably a dozen office managers' representatives, I finally concluded to stay where I am now. With some little alterations, which will cost some money, and with a slight reduction of space, which does not mean anything to me because the alterations will give us some more available space, the rent will be reduced from $620 a month in the Conway building, which we are now paying, to $297.25. That gives you an idea of how Chicago is overbuilt, particularly in office

W. F. Wise, retiring president

buildings. My previous experience has been that Chicago catches up pretty rapidly, and in spite of the pessimism displayed in this report, I still am hopeful of better things for next year.

J. E. Cushing (Schenectady, N. Y.): The production for the year 1930 was lower than 1929, both in commercial sizes and railroad ballast. This was principally due in the commercial field to the state road work getting under way with a late start. A large portion of the proposed road work is for lettings in 1931, which, together with the uncompleted work, should give the industry an early start. Labor conditions during the past year, due to the unemployment situation, offered a large source to draw from, although in our own particular case the personnel was about the same as in previous years. The scale of wages was practically the same as heretofore. Conditions in 1931, judging from the programs outlined to handle the unemployment situation, look favorable at this time and a normal year is anticipated.

C. M. Doolittle (Hamilton, Ont.): Again it is my privilege and pleasure to extend to you hearty greetings and expressions of good will from your northern cousins. Notwithstanding that we cannot claim an unqualified prosperity, we still are far from being discouraged and are confidently anticipating a gradual betterment of industrial and commercial activity that will produce a more general healthy situation. The condition in regard to our wheat is admittedly very serious, but these problems have a fashion of working themselves out to a satisfactory solution. If necessary, we can produce the cheapest wheat in the world, as well as the best. Our next administration at Ottawa seems determined to preserve our domestic markets for domestic production, and in this Washington has certainly set the pace. Time will tell the result of this policy. In any case, our government was elected to that end, and so far there can be no critcism in regard to its methods of functioning. I had the privilege of being in London, England, during the Imperial Conference. While it does not seem that any considerable result has been accomplished, there can be no question of the very favorable impression created by Mr. Bennett, and it is my firm conviction that ultimately a proposition fostering inter-Empire trade will be worked out along the lines of the Canadian Premier's suggestions. While we in Canada must recognize a general falling off from 1929 figures in almost all branches of industry, it must be appreciated that 1929 was an abnormal year. Notwithstanding decreased earnings, our railways have maintained a very large purchasing capacity. Building activity has continued in all our large centers and we have extended and improved our highway systems, as those of you who motor to Canada must recognize. Canadian quarries have had a good year, despite the many unfavorable elements. My own organization again had sales aggregating well over a million tons in 1930, and present indications promise well for 1931. We are becoming more Canada-conscious, and feel that heretofore we may have been a bit too modest. We aspire to maintain and foster a healthy respect for law and order, and to that end we attempt to avoid injudicious legislation. We are awakening to the true significance of our vast natural wealth and are striving to develop our resources on a sound basis. We view the future more confidently than ever, feeling that honest effort will insure a just reward. My earnest desire is that you of this republic may enjoy a prosperous year. In this I am not altogether unselfish, as we are so closely allied that conditions in the two countries cannot but react upon each other. Depressions arrive suddenly; prosperity must be built up slowly. Let us build surely.

REPORTS from the directors gave a remarkably clear survey of the crushed stone situation throughout the country. It is expected that 1931 will be as good a year as 1930 and in some respects better, especially in those localities where the unemployment situation will be relieved by heavy road building. Considerable new equipment was installed during the year in order to reduce the cost of production and meet tightening specifications.

M. A. Altgelt (New Braunfels, Tex., reporting in the absence of **E. Eikel**): It is true that in 1930 rock did not move in Texas in train loads, as it did the year before. However, we have been shipping train loads of green vegetables, spinach, onions, corn, and grapefruit and oranges, north. We have not suffered the hardship that you people in this part of the world have. Business conditions in 1930 have been reasonably good. I think it is close to 10% or 15% less than in 1929. Prices have been reasonably steady. They are now stiffening a little bit. Our president has told you that we have a program in the city of Austin for state and federal highways amounting to something like $6,500,000. We will have something similar to this each month during the year. Large dams and harbor work are progressing. We now boast the second largest export harbor of any city in America in Houston. On top of that, they are constructing the largest flying field 18 miles from our place. It is true they are not using crushed stone there, still, they are using concrete. Of the important things that happened during 1930, I will mention briefly: In November the producers of crushed stone, sand and gravel met in the city of Austin and the Southwestern Division of the National Crushed Stone Association ceased to exist as such and a new association was born, and the name given to that was the Texas Crushed Stone, Sand and Gravel Association. Trade practices are beginning to be appreciated. We are beginning to realize that there is room for all of us, that we should not do a cut-throat competitive business like we have been doing, even in Texas, in the year or two passed. So we look forward to some improvement in Texas. We are looking forward to having those of you who travel for pleasure come through Texas and see that we have many, many miles of good concrete, asphalt, and other types of roads leading down to another country that is rather liberal-minded. I mean Mexico. Just across the border from us is a city called Laredo, Mexico. There is a Laredo, Tex., and Laredo, Mexico. They are twin cities. You can drive to the city of Monterey, which is one of the historical spots of North America. There is a straight stretch of road leading between the cities of Laredo and Monterey, 14 miles, as straight as it is possible to build a road. As a matter of fact, it is straight. There is not a grade crossing, there is perfect alignment, and there are no highways crossing it. You can open your cars wide open, if you like, and you will not meet much traffic. But at the end of the line you find Monterey, wide open, free, liberal as possible. I thank you. (Laughter and applause.)

F. T. Gucker (Norristown, Penn.): In eastern Pennsylvania the demand is less than in 1929, but we hope 1931 will be better.

W. E. Hilliard (New Haven, Conn.): The conditions in the crushed stone business in southern New England during 1930 were less favorable than in 1929. The demand, and therefore the production, was somewhat lower, although the capacity of the plants in our section of the country had been increased over the year before. Prices in general were somewhat lower. The programs for 1931 of the several states in that section of the country indicate that the construction of a substantial volume of public works is contemplated, and to some extent already definitely planned. There is not much promise yet of renewed activity in private building projects. Southern New England is largely occupied in manufacturing, and has been seriously affected by the business depression of recent months. When business in general begins to recover its normal volume and momentum, we shall look for more private building in our immediate territory.

Summing up the situation, we are en-

couraged to believe that the season of 1931 will be more satisfactory to the producers in our territory than the season of 1930.

E. J. Krause (St. Louis, Mo.): While the football season has been over for some time, the public is still considerably occupied in kicking around the word "depression." Suffice for me to say that southern Illinois experienced a decrease in expenditure for private work during 1930, and while this territory experienced an increase in expenditure for public work, this was not sufficient to make up for the loss in the former instance. This made for a lower tonnage in our territory during 1930. It has been my pleasure to report for some years past a spirit of hearty co-operation on the part of southern Illinois producers. I regret greatly to have to say at this time that such was not the case during 1930. Demoralized business conditions had their demoralizing effect on this past spirit of co-operation, and the outlook for 1931, in the light of this lack of co-operation, is not extremely favorable.

A. S. Lane (Meriden, Conn., reporting for Massachusetts): The year 1930 opened with bright prospects for the broken stone industry of Massachusetts, and business up to midsummer fully warranted the report made to you one year ago that "prospects were good for the largest production yet experienced." However, as the railroad reports of operation for the first six months of the year began to come in, there were rumblings to the effect that ballast orders would be cut down, as earnings did not warrant the outlay, etc., and by August 15 all ballast orders were unceremoniously canceled. When it is realized that quarries in Massachusetts have accumulated capacity for about one million tons annually of ballast—in addition to other lines—it will be seen that a new condition rapidly developed. The call from the building trades was very light, but fortunately public works were running strong and relieved the situation to some extent. At our own quarries our total is down 25% from 1929. Reports received indicate that for the state as a whole the tonnage for 1930 was 12% to 15% under 1929, with prices off a little. So far as can be learned, no new plants or changes to increase capacity are contemplated this year, in fact the indications are that it will be impossible to keep existing plants running to anything like capacity. Whether this will result in an undue scrambling for business, and consequent cutting of prices, already too low, or whether there will be a curtailment of output, remains to be seen. Indications for 1931 are that the road stone requirements may be a little better than for last year, although gravel is making heavy inroads in some quarters. Building business is very light and ballast still uncertain. It is therefore difficult at this time to prophesy just what may be expected, as a whole. Personally, I shall be surprised if when we reckon up the tonnage for 1931 it does not at least equal 1930.

Col. E. J. McMahon (St. Louis, Mo.): The general depression has had local complications due to another variety of the eternal triangle; namely, a price war—gravel vs. stone, gravel vs. gravel, and stone vs. stone. We find consolation in the remark that business is on its back and looking up. My report for the St. Louis district for 1930 comes under the poet's heading, "Short and simple annals of the poor." We are still working under both a state, a county and a city bond issue, so that quarries located convenient to new road and street jobs have done comparatively well. Our smaller quarries specializing more in building stone and reinforced concrete for structural purposes have had an extremely bad year, as our building permits dropped off two-thirds compared with a few years ago.

AN unfortunate outgrowth of a reduced demand in 1930 has been the development of a highly competitive situation in some localities which have heretofore fostered a delightfully co-operative spirit. This was commented on by E. J. Krause, of St. Louis, as applying especially to southern Illinois as a result of demoralized business conditions. The cancellation of ballast orders brought consternation in some sections.

Russell Rarey (Columbus, Ohio): The year 1930 in Ohio was a year of sharply reduced production and highly competitive prices. Those plants whose sales were confined to road construction materials suffered but little loss in volume, while those plants who were dependent to any substantial degree on sales of railroad ballast and furnace flux suffered heavy tonnage losses. Some few plants devoted entirely to road and other commercial sales actually increased their production over previous years, but generally this increase was accomplished by sharp reduction in selling price. The price tendency of all stone marketed in Ohio was down. This effect was brought about by reduced demand, particularly from railroads and steel mills, and from a competitive situation on commercial business that became intense. The lower prices prevailing made necessary certain operating economies and the situation was helpful in that regard. In 1930 the early months of the year were best, while in 1931 the early months will be poor, with conditions expected to grow better as the year progresses. Average for the year 1931 over 1930 appears to be no better, either from a tonnage or price standpoint, and perhaps the best thing to be said for 1931 is that it should see an improvement in conditions that should lead to better business in 1932. Aside from the influence of general business levels on stone production, the new tax amendment to the Ohio constitution that was authorized by the last legislature will have considerable bearing on the road construction materials. There is still a great demand for more and wider roads, but due to economic conditions prevailing generally, the Ohio plan, used on all roads other than state roads, of assessing a considerable percentage of the cost against abutting property, is proving burdensome and property owners are petitioning against rather than petitioning for road improvements. If the present legislature can correct this situation, road construction on projects other than state highways should again resume normal proportions. Here, again, the improvements will be reflected in 1932, as no legislation by a 1931 legislature will be effective until the following year. In short, 1930 was poor, with 1931 promising little, if any, better.

John Rice (Easton, Penn.): In accordance with custom, I am making this report, which covers eastern Massachusetts and a substantial portion of the Middle Atlantic States. The season of 1930 compared very favorably with the previous year, and were it not for some curtailment during October and November it would have surpassed the previous season. The 20% to 25% shrinkage in railroad ballast was made up by the increased highway activity in practically all the states, although there was some decline in both respects in Massachusetts. In the latter part of December I attended a meeting of the Atlantic States Shippers' Advisory Board and the reports submitted to the Advisory Board would seem to indicate that in the early part of 1930 there would be a curtailment in our line of business. However, the early season business is always one of questionable volume and little indicates what may be expected of the year. While there is no reliable expectation of renewed railroad purchasing, there still remains the activities of the highway departments and many other lines of business stimulated by the unemployment agitation, so that I look forward to the coming year very complacently.

H. E. Rodes (Nashville, Tenn.): The 1930 tonnage was considerably below that of 1929. Highway and general construction was less by about 25% and ballast was between 30% and 35% less. The general impression in the industry is, tonnage will be quite a bit less this year than it was last year. In 1930 prices were considerably lower.

W. R. Sanborn (Kankakee, Ill.): Reporting conditions in Illinois for the year

1930, business has been generally much below last year's level and prices have fluctuated tremendously. The general depression is reflected in the lack of municipal work and private enterprise. The most notable feature of the situation in northern Illinois has been the consolidations in the Chicago region. There are now only three big operators in Chicago. These consolidations have put the stone companies into the gravel business to a very considerable extent, and other companies who have not consolidated are acquiring gravel pits. It is difficult to forecast the situation for 1931 under present conditions.

James Savage (Buffalo, N.Y.): Crushed stone production in western New York last year was affected adversely by a marked decrease in orders for railroad ballast and the low level of building construction and real estate development programs. Highway construction was continued in fair volume, but was somewhat below the previous year. Prices for crushed stone were well maintained. Although efforts are being made to hurry the letting of contracts for all kinds of public work to relieve the unemployment situation, the outlook for any marked early improvement in private building construction and increased purchases of ballast by the railroads is not particularly encouraging. However, we are looking forward to a gradual bettering of conditions and really satisfactory business by the third quarter of 1931.

F. W. Schmidt, Jr. (Morristown, N. J.): In 1930, due to less volume of business and excessive capacity, the stone industry in New Jersey did not escape from the workings of the basic economic law of supply and demand, resulting in lower prices for the commodity. This condition also exists in the sand and gravel industry in this territory. There is a limit to which prices can descend without creating harmful cut-throat competition, which is bound to result in complete demoralization if not corrected. Bringing about a balance between production and market requirements seems to be the remedy for this unhealthy condition. As to 1931, the outlook is for a slightly increased demand for highway and building construction. We do not anticipate that the railroads will require very much ballast. It is hoped that producers will profit from the experience of 1930 and make a serious effort during 1931 to co-operate to the end that production is kept down to market consumption, thus making for the stability and prosperity of the industry.

J. F. Schroeder (Davenport, Iowa): During the year 1930, Iowa had a very large paving program and used a very large amount of coarse aggregate, both stone and gravel. However, the eastern part of the state of Iowa did not share equally with the other parts of the state, for the reason that more paving had already been done in the eastern part than in some of the other sections, and on account of this condition the prices received for coarse aggregate over the greater part of the state, where the largest number of miles were paved, were quite satisfactory, while the prices of the materials at a greater distance were about average of what had been received during the previous years. The western part of Illinois in this vicinity also had quite a little paving done, but on account of Illinois not having done much paving for several years, their prices for materials were low and very competitive. The building construction during the year of 1930 was below normal, and the year as a whole might be considered an average year, although some of the material producers had a very good business, both as to quantities sold and prices. The year of 1931 will see less paving construction in the state of Iowa, although it appears that the number of miles to be paved during 1931 will be a satisfactory yearly average. It is also expected that the western part of Illinois in this vicinity will show an average amount of paving done. On account of disturbing factors in the sale of coarse aggregate, it is always difficult to make a future prediction as to what the prices may be, and on account of these disturbing factors it is not possible to make any prediction that prices might be well stabilized for any length of time, although the producers, generally speaking, are trying to maintain prices that will leave some profit. It is very doubtful whether 1931 will be any better than a normal average year with less paving to be constructed during 1931 than was laid in 1930. The demand for agricultural limestone is showing a steady, gradual increase from year to year, even though the farmers are being urged to curtail production. The prices have also been steady and satisfactory.

IN some of the states which have not done so much highway building previous to 1930, the situation has been better than in some other localities. This has been noticeable in Iowa, especially in the western section, where road paving has been quite vigorously pushed during the past year, and producers have benefited accordingly, notwithstanding the falling off in building construction.

W. L. Sporborg (Syracuse, N. Y.): In the state of New York the year 1930 was a pretty good year for business. Some concerns did more business and earned more profit than in 1929, and other concerns not so well. The stone industry as a whole had a fairly good year. The active season was later than usual in opening up, and it ended a little earlier than usual. There was very little rain during the season, so that construction work went on more steadily than in most years. The year 1931 promises pretty well. Highway construction promises to open up earlier than usual and in good volume for the year. City paving promises fairly well. Building construction does not promise well. As for railroad work, it seems impossible to know in advance what that will amount to. It may be the railroad people themselves do not know. The stone business is not like it used to be. Business has speeded up so. Management is called upon for attention to detail, and at the same time for deep insight and broad vision, for understanding of others, and for tolerance for the motives of others. It seems this is more so as time goes on. The happiness of the individual man seems to be a minor consideration in business life. Progress is perhaps an even greater capacity for effort and accomplishment.

Mortimer D. Wandell (New York City, by letter): I believe that there was in the year 1930 a shrinkage in the demand for crushed stone in the New York metropolitan area, that is, the territory within a radius of 150 miles of New York City, of between 5% and 10%. And when you remember that there is produced in that section normally about 7,000,000 cu. yd. of crushed stone, you may see that this shrinkage was considerable. I also believe that there has been a falling off of about the same percentage in prices. Building construction in that territory has fallen off very much, and the large bulk of work has been street and road construction and in New York City, subway and bridge construction. All cities, counties and townships in this area, because of the unemployment situation and the general business depression, have done just as much public work as possible, and a larger amount of work than they have been doing under normal conditions. It is, of course, peculiarly unfortunate that in these times of depression and shrinkage in demand, the producers not only lose volume, but that fair prices for material, established during normal times, cannot be maintained. The principal reason that prices have fallen off in our territory, and in other territories, is, of course, the ill-advised attempt on the part of most of us to maintain our peak productions of normal times and to jam into the market a quantity of material that it cannot absorb, allowing our excess production to slop over into territories normally supplied by other producers, with the result that prices are demoralized. The answer, of course, is curtailment of output, and I believe that most of us, during the continuance of

these times of subnormal demand, will have enough good business sense to work more eight-hour days and five-day weeks, or to shut down certain units, if necessary, and in this way be enabled to maintain a fair price for our material. I believe that the metropolitan area will absorb as much crushed stone in 1931 as it did in 1930, though not very much more, but I feel optimistic at the gradual but continual improvement in our own and general business conditions.

Porter W. Yett (Portland, Ore., by letter): The crushed stone consumption has fallen off approximately 50% for the current year, due somewhat to the general business depression. In the Pacific Northwest we have also suffered severely from gravel aggregate competition in cheap asphalt pavements. This form of competition seems to be making much more progress than we anticipated. Pre-mixed concrete plants manufacturing concrete with lower grade aggregates has also taken its toll. Railroad ballasting work has been seriously curtailed by the railroads and in many cases the railroads have resorted to pit-run gravel ballast. If other portions of the United States have encountered similar encroachment on their tonnage, the association will have to put forth every effort and means at its command, as the tonnage outlook for the coming year does not appear to be any brighter. If we can devise some ways and means to regain our share of the tonnage which we seem to have lost, the association and its officers will have performed heroic service.

B. G. Shotton (Pittsburgh, Penn., for the Manufacturers' Division): The year 1930 was not generally a prosperous one. Orders for fluxing stone and railroad ballast were not up to the usual yearly average hence the demand for equipment from plants producing these two classes of stone was noticeably lessened. As a whole, however, manufacturers of equipment used in the crushed stone industry have not suffered so keenly from lack of business as have those engaged in other lines. The outlook for 1931 appears more promising. Already the mills in the Pittsburgh district have received orders for a large tonnage of rails. This will in turn result in orders for fluxing stone and ballast. State highway departments are making preparations for increasing road building programs. Public works have received increased appropriations from the federal government and doubtless state legislatures will follow the example set in Washington. All of which indicates there will be an increased market for crushed stone. Speaking for the Manufacturers, whom I have the honor to represent, I would report that we are all making preparations to render quick and efficient aid to those of you who may require service due to the increase in business which we feel is bound to occur.

An Economist's View of Construction Outlook

Thomas S. Holden, vice-president, F. W. Dodge Corp., New York City, said: "The year 1930, with its numerous hopes and disappointments, taught the business world and the construction industries a number of salutary lessons. It opened with a general feeling of confidence that recovery would come in the middle of the year, that the recession, which had started in residential building as early as the middle of 1928, would be comparatively short-lived and that a major depression would be avoided in 1930.

"As the year progressed, we learned that there were surpluses of residential, commercial and industrial buildings in the country that must be absorbed before a new demand for these classes of buildings would come back. We learned that the extraordinary volume of private building activity that this country had in the five years, 1925-1929, a volume larger by far than that of any previous five-year period, was to a far greater extent based on unprecedented amounts of capital and credit made available in new and unregulated ways than on any intelligent appraisal of the actual construction needs of the country. We learned that while it was possible to mobilize quickly an emergency program of public building and public works and achieve in a depression year a record volume of such operations, such volume was not sufficient to offset the radical decline in private building activity and probably could never be sufficient to achieve such stabilization without a long-range plan made far in advance of the catastrophe.

SEVERAL lessons drawn from the experience of the past year were analyzed by Thomas S. Holden, of New York. Chief of these was the surplus of residential, commercial and industrial buildings, which must be absorbed before this class of construction could be expected to show renewed activity. He expects to see the upturn in this class of construction start during the present year.

"In 1930 we saw the estimated total volume of all building and engineering work in this country drop to $5,876,000,000, compared with $8,950,000,000 in the biggest year, 1928; a decrease of 34% compared with an average of $7,002,000,000. For the ten years preceding 1930, there was a decline of 16%. Last year's total volume was under that of every preceding year since 1922.

"It is quite evident that such a serious interruption in the upward progress of American business and American construction growth must have resulted from causes that arose some time previous to the break and gained cumulative force and effectiveness over a period of several years. It will pay us to make a quick survey of the events that led to the breakdown of last year, a survey of the ten years preceding 1930. The ten-year period falls quite conveniently into two equal divisions.

"During the five years, 1920-1924, the American people invested approximately $27,000,000,000 in new building and engineering work. While the period began in a depression year, 1920, it also began with an accumulated shortage of practically every class of building and engineering construction except factories. Following 1920, large and continuous annual increases caused the shortage to be made up by the end of 1924. At the end of 1924, the F. W. Dodge Corporation's statistics of contemplated building and engineering projects stood in a normal relationship to the statistics of contracts actually awarded, having had an abnormally high ratio throughout the entire five-year period of shortage. During the following five years, 1925-1929, the volume of contemplated construction reported and tabulated was abnormally low in proportion to the volume of contracts actually awarded, showing a speed of construction activity in excess of normal demand.

"The normal expectation after 1924 was for moderate annual increases in building and engineering volume. But, with this moderate expectation, what did we actually get? In the five years, 1925-1929, the people of this country invested approximately $43,000,000,000 in new building and engineering work of all kinds, compared with $27,000,000,000 in the preceding five years; an increase of 60% in a period when there was no shortage to be made up.

"It has now become evident that this five-year boom period, 1925-1929, was one in which the American people attempted to increase their physical wealth in terms of improved real estate by over-stimulation of credit and by producing new buildings considerably in excess of normal current needs. When we read, as I did some two months ago, a statement to the effect that $4,000,000,000 in first mortgage bond issues were in default, out of a total of $18,000,000,000 outstanding, we see striking evidence that abuse of credit had much to do with the unfortunate things that have happened. It now seems rather likely that something near $35,000,000,000 for total building and engineering work in the five-year period, 1925-1929, would have been more nearly normal than the $43,000,000,000 the country actually spent in those five years. In short, we may say that by the end of 1929 the country had over-anticipated its construction requirements, principally in private building work, by a full year. That is why readjustment was necessary in 1930 and why readjustment must be completed in 1931.

"As a matter of fact, readjustment of the building program started in the latter part

of 1928 with a sizeable reduction in residential building volume; that class being the one which always drops off first when a recession in business activity is on the way, and also the one that is first to start increasing when business recovery is in preparation.

"Residential building continued to decline in 1930, and reached a level of activity 60% below the peak, a volume lower than that of any year since 1921. It does seem probable that residential building struck bottom in 1930 and should increase this year. While the surplus has not been worked off in all places, there are a number of cities and towns where a balance has been struck between demand and supply and where increased spring activity seems to be the logical expectation. With new demand arising here and there and spreading from one locality to another, carrying with its spread increased confidence in building and business recovery, the prospect in this section of the building field is quite hopeful, even though there is no warrant for anticipating any speedy increase to the proportions of another residential building boom. Important cost reductions are a powerful incentive to recovery in this field as fast as new demand appears.

"Commercial and industrial building have run about a year behind residential building. Both reached their peaks as late as 1929, and both existed in sizeable surpluses when this year opened. It looks very much as if it would take most or all of 1931 to complete the adjustment of demand to supply in these classes of operations, and their volume in 1931 is rather likely to be less than it was last year. We do not usually expect recovery in these classes of buildings until after we have had a recovery of general business activity.

"Public utility companies have been enlarging their facilities to meet the demands of our expanding industries, but here it is less a question of readjustment to demand than one of gaging their expansion to a rate justified by a somewhat slower growth of business and community needs. New construction by public utility companies in 1931 may be somewhat less than in 1930, but probably not by any very large amount.

"Public building and engineering work are always in demand to bring community facilities up to the expanded requirements of population and community development. The limitation here is in the amounts that may be wisely spent out of current taxes and in the amounts that may be wisely raised by bond issues. There have been reports of mounting volumes of delinquent taxes and there has been talk of the necessity of curbing somewhat the volumes of bond issues put out by states, counties and municipalities. These limitations may operate toward some curtailment in 1931, though no adjustment similar to that which private building work has been undergoing seems necessary.

"With regard to highway construction, the American people seem to be committed to a program of continued expansion, its highway traffic problems are still numerous and growing, and its provision by means of gasoline taxes to meet the expenses of new highway construction seems to obviate the difficulties set by tax and bond limitations. It seems rather likely that the record volume of highway construction we had in 1930 will be approximately duplicated in 1931, and that it probably will not fall much below that figure in the years to follow this one.

"While the construction industries on the whole face this year with a prospective total volume of building and engineering work approximately equal to that of 1930, they are likely to see completion of readjustment and beginings of recovery, consisting of the following important items: (1) A definite upturn and a definite increase in residential building; (2) a more normally balanced building and engineering program; (3) more numerous small projects; (4) liquidation of present surpluses of commercial and industrial buildings.

THE year 1931 is likely to be one of preparation for more extended recovery in 1932 and thereafter, according to Mr. Holden, with 1934 reaching a total volume equal to any year we have had in the past. He believes we are accumulating a fund of knowledge which will be of great value in charting future activities.

"In any event, the year 1931 is likely to be one of preparation for more extended recovery in 1932 and thereafter. Undoubtedly the growth of our population and wealth will call for a larger volume of building and engineering activity in the ten years, 1930-1939, than we had in the years 1920-1929. Even so, our recovery is likely to proceed somewhat slowly during the next few years, and it may take until 1933 or 1934 to again attain a total year's volume equal to the volume of the highest year of the recent boom. Even with such slow recovery, we are likely to see a somewhat larger proportion of public building and engineering work to the total than heretofore.

"While our over-rapid expansion made our readjustment rather costly, much progress has been made in the past ten years that will enable the construction industries to do a sounder job in the next ten years. Building and real estate grew from purely local enterprises into national industries; comprehensive statistics on all sections of these big businesses brought to construction and to real estate recognition as national enterprises from the entire business world; building and engineering projects developed to larger and larger scale, the quality of construction improved; new and improved materials have been developed, and new methods of using existing materials; technical competence, managerial capacity and knowledge of the fundamental economics of our business have been greatly improved by the progressive programs of our trade press, the splendid educational and coordinating efforts of your own association and other important trade associations in the field; coordination of diverse elements in the building industry on a local basis has been greatly forwarded by the spread of local building congresses.

"In short, we are accumulating a body of knowledge which is turning business men engaged in construction enterprises toward a professional point of view and is bringing the professional men closer to the business point of view. We are becoming conscious that the construction industries play a vital role in the development of a national community life. We realize that the growth of this national community life means increasing business opportunities for us and we mean to give to our customer, the American people, better values for each dollar spent for the products of our plants, factories, designing offices and construction operations."

Sales and Promotion

On the program, under the title "How to Win an Argument," Professors **Allen C. Bussey and E. E. Nyberg,** of New York University, New York City, presented much more than an ordinary paper or lecture. They actually acted out a little dialogue which was amusing, instructive and forceful.

Any attempt to put it in printed form would do scant justice to it. In essence it was designed to emphasize certain points in salesmanship—rather perhaps how not to do it than how to do it.

Acting out the parts of salesman and prospect, the two professors showed in a convincing and entertaining manner how to win an argument as well as how not to go about it, demonstrating what they called the six principles of salesmanship, namely:

(1) In a business argument, don't do too much talking yourself.

(2) Be careful not to interrupt the prospect to answer an objection he is trying to put into words.

(3) Be careful not to slip into a belligerent, argumentative or too positive manner.

(4) During the course of an argument, inquire first rather than attack in order to learn what the objections are.

(5) Be sure that the prospect is allowed to state his objections and then take the trouble to re-state them to him to prove that you have clearly grasped them.

(6) After all maneuvering is over, take the one most important key objection in the

mind of the prospect and nail it down and stick to it rather than digress to the less important ones.

As their little skit was acted on the stage of the convention, one could readily appreciate the reasons for each of these six principles—the first three, for example, because too much talking, interrupting the prospect and a belligerent manner are irritating, and one strong reaction is to magnify the objections under these conditions, whereas if the principles 4, 5 and 6 are followed, the prospect clears his mind of the objections, and they do not loom nearly so large to him then as if he is not permitted to rid himself of them.

These six principles were formulated after a study of a great many business arguments extending over a period of years to determine why some salesmen habitually win while others fail regularly.

The authors, however, made it perfectly clear that a thorough knowledge of one's product was more essential than any "strategy" could possibly be.

Robert J. Kratky, attorney at law, St. Louis, speaking on "Popularizing Industry," urged the dramatization of the crushed stone industry through promotional work and advertising so that the layman outside the industry would instinctively think of it in connection with his home and all other building construction. He was not very specific as to how this might be accomplished, but it is obvious that an ordinary home owner can be impressed only through media which reach him, which are large newspapers, popular magazines and moving pictures—all rather expensive media.

Promotion of Secondary Roads

A good share of the program of the convention had to deal with the bituminous or secondary types of road, as it is generally conceded that this type of road improvement is one upon which the largest amount of funds will be spent in the next few years.

All of the papers and discussions on the bituminous types of road were by men connected with the asphalt or tar industries and were primarily sales talks in behalf of this type of road. As examples of sales talks, they were undoubtedly of much value to the crushed stone producers as well as containing much helpful information which they themselves could incorporate in similar sales arguments with local highway authorities whom they might be able to induce to try out this type of road.

B. **E. Gray,** highway engineer, the Asphalt Institute, New York City, speaking on the economic features of the bituminous type of road, discussed the problem which faces tremendous areas and populations in this country, of improving a large amount of secondary roads with very limited funds. He argued for a flexible type of road surface continuously maintained and said that lack of continuity of highway administration during the last few years had accounted for a great deal of waste in road construction.

He stated there had been a large increase in the last three or four years in roads of this character and it was the correct economic solution of serving as large areas as possible with serviceable roads until such time as traffic conditions might justify pavements of other types. He deplored the attitude of some highway authorities to stick to the single type of highway surface as entirely wrong and said that in a great many instances the pavement of roads had resulted in a dispersion of traffic rather than a concentration of traffic, so that the lighter types of surfacing were answering quite satisfactorily. He also said that the balloon type of automobile tire has resulted in a marked influence on highway design. He was sure that the single lane type of pavement would not prove satisfactory and that one outstanding demand of the future will be for a bituminous type of surface, gradually building it up to meet traffic conditions as against the former policy of design to provide an original pavement thickness to take care of all conditions. He stated such a course was not a temporary measure but was entirely a question of economics, and that only lack of knowledge had prevented an earlier development of low cost pavements of this type. He mentioned particularly the work of the U. S. Bureau of Public Roads in an investigation of sub-soils as having helped very materially to bring about these developments. He stated there are still large areas where very little knowledge is available of present technique, which takes care of all former troubles, in his opinion, with asphaltic type roads; and his conclusions were, although not specifically stated in so many words, that the crushed stone producers could help their own business as well as his own by promoting this type of road and spreading technical information among those who were still in the dark in regard to its merits and economy.

SEVERAL speakers discussed types of secondary roads, to which it is felt much attention must be given in the next few years in order to get the highest service from the main traffic arteries which we have built. Representatives of various surfacing materials took part in this discussion and added something to the technical knowledge of the subject.

C. L. McKesson, director of engineering and research, American Bitumuls Co., San Francisco, Calif., spoke along similar lines, emphasizing with a considerable number of statistics the alleged economy of bituminous type road improvement over all competitors; and he emphasized the enormous percentage—96% of all the highways in the country—which are still entirely unimproved.

George E. Martin, consulting engineer, the Barrett Co., New York City, representing the Tarvia interests, amplified Mr. Gray's paper somewhat in the way of a sales argument for this type of pavement as against what he termed "high type" pavements. He stated the time of the isolated high type pavement was past, although he did not make it very clear where there were any instances of such "isolated" pavements. He also emphasized the great opportunities for co-operation between crushed stone aggregate producers and bituminous material manufacturers.

The talks of all three gentlemen were very flattering to the crushed stone industry as ample evidence of the desire of the bituminous material interests to cultivate them and to win their more active co-operation. It has already been stated that the papers were instructive as examples of first-class sales talks.

Charles M. Upham, engineer-director, American Road Builders Association, Washington, D. C., discussed the "Secondary Road Problem" without any mention whatsoever as to the type of pavement that might be or should be improved other than to say that he believed that the material interests who opposed the improvements of secondary roads with some cheaper type of surfacing were making a mistake because the improvement of these secondary roads merely helped them to fulfill their functions as tributaries to the main highways, and that producers of more permanent paving material for main or arterial highways would benefit in this way from every improvement made on secondary roads.

Mr. Upham estimated in the neighborhood of $2,500,000,000 is now spent on road work each year and that in 1931 the state highway work would increase a little, but that the counties offered a very much bigger field. He then demonstrated by charts how the money spent by various highway authorities was divided, showing that a very large part of the enormous fund spent annually on county and township roads is wasted on administration and maintenance rather than spent on construction.

As citizens as well as material men who will benefit by greater efficiency and economy in county and township administration it is obvious that crushed stone producers should use whatever influence they have in the direction of sound financing and organization.

This is apparently accomplished best through some sort of state highway department supervision of county and township work such as is done in Pennsylvania, New Jersey and some other states. There is a tremendous field for improvement in this regard, for Mr. Upham stated that only about one-third of the counties in this country at the present time have adequate advice

on their highway expenditures and very few have any kind of adequate engineering supervision.

The mileage of unimproved roads in this country, according to Mr. Upham, is somewhere in the neighborhood of 2,700,000, but an analysis of these has shown that approximately 25% of them were unnecessary and could be eliminated, so that what improvements are made in the future on these secondary roads could be confined to this 75%. The whole paper was an argument for the interests of the crushed stone producers both selfishly as producers of material and unselfishly as citizens of their respective communities to take more interest in the administration of local highway funds. It is now possible, he said, to scientifically determine the amount of money that can be raised by bond issues for highway construction, and that there is no longer any excuse for proceeding blindly in such matters. He was sure that a highway program of at least $3,000,000,000 could be justified in 1931 on the basis of scientific and economic reasoning.

Ballast

J. V. Neubert, chief engineer of maintenance-of-way, New York Central railroad, New York City, spoke on "What Factors Control the Service Value of Ballast?" He briefly reviewed the qualifications of ballast which would give it a maximum service life. (1) It should resist crushing, should resist tamping tools and not disintegrate in weathering. This requires knowledge of (a) specific gravity, (b) toughness, (c) resistance to wear, (d) cementing value, the last, of course, not being a desirable attribute.

He said the size was very important in order to have the desirable cushion effect as well as to provide ample drainage. In order to be sure of getting a perfectly clean stone, he said they had considered specifications requiring washing of the product, as foreign matter has a tendency to cling to ballast stone which is not perfectly clean.

Changes in railway practice, such as the introduction of automatic stokers, which make finer cinders, have had an influence on ballast in this regard. There was no question but that ballast stone should be as clean as it is possible to make it; and he thought in general that vibrating screens gave better sizing than the older type of rotating screen.

Cleaning ballast which was formerly more or less experimentally done is now done periodically on such roads as the New York Central. Ballast cleaning is now done regularly two to four years apart, and this prolongs the life of the ballast, as well as helping to maintain satisfactory drainage conditions.

Boiled down, he said that the specifications for crushed stone ballast of the New York Central railroad call for stone 2¾-in. down to 1-in., with no dust. As to the life of stone ballast, Mr. Neubert said that there was no record available showing that stone ballast had been used to destruction. Tests had been made to determine this but were abandoned without results.

In the 30 years that he has used crushed stone ballast, the ballast has been applied in resurfacing track; some has been lost in the subgrade, but such as has remained to function as ballast has remained every bit as good as new ballast.

Mr. Neubert estimated that the loss in ballast from re-screening and cleaning, and that which is lost in the subgrade, accounts for a replacement of from 2½ to 3½% of new stone annually.

Referring to the practice of some railways of producing their own ballast, Mr. Neubert said that he believed the business of a railroad was to sell transportation, and that it should not engage in manufacture of any character. He also said he believed that good specifications, properly enforced, resulted in better materials than the railroads themselves could possibly make.

IT was stated by a railroad maintenance engineer that there is no available record of stone ballast ever having been tested to destruction. Tests have been started along this line but have been abandoned without results. He does not believe in the practice followed by some roads of producing their own ballast.

Sewage Disposal Stone

The prospects of sewage disposal as a consuming market for crushed stone was discussed quite unqualifiedly. The construction of sewage plants is becoming increasingly important as sentiment against the pollution of streams increases.

Both sides of the subject were quite thoroughly discussed at the convention, so that no crushed stone producer need have gone away with any feeling of unjustified optimism.

S. W. Freese, of Hawley, Freese and Nichols, Fort Worth, Tex., spoke on "The Applicability of Various Methods for Sewage Disposal," and explained the two most common systems of sewage treatment, the activated sludge system and the trickling filter system. In the latter, of course, considerable tonnages of crushed stone are used.

According to Mr. Freese, trickling filter systems are especially applicable to towns of 20,000 or less population, with other factors, such as cost of land, cost of stone and the location of filter plant in respect to dwellings, entering into the problem in the case of larger towns.

Unless cheap crushed stone is available, he said the cost of the treating plant is likely to be more than that of an activated sludge type plant, which is, however, more costly to operate because of the greater supervision required. He used the occasion to protest the price of stone asked for some of his own projects.

Prof. Harry N. Lendall, dean of the department of civil engineering, Rutgers University, New Brunswick, N. J., discussing Mr. Freese's paper, favored the activated sludge type of plant over the trickling filter type, and predicted that the trickling filter type would disappear from use within the next decade—and with it of course the demand for filter stone.

Another point touched on in this discussion was the construction of concrete pipe in connection with sewage disposal plants, with the mention that pipes of over 24-in. diameter were usually being made at the present time of concrete.

Ready-Mixed Concrete

H. F. Thomson, vice-president, the General Material Co., St. Louis, Mo., and vice-president of the National Ready-Mixed Concrete Association, discussing "Ready-Mixed Concrete," gave interesting information on this rather new construction method, taking the point that ready-mixed concrete is a building material the making of which is a specific manufacturing operation, as against the old conception that concrete mixing was simply another branch of the construction industry, to be performed on the job.

This newer conception is due in part to the fact that the material is made in a plant removed from the building operation and that the facilities are such that a much more uniformly high quality concrete is thus produced than would be possible in the ordinary temporary mixing plant on the job. Besides quality, convenience has been a factor in the growing use of this method.

According to Mr. Thomson, some 6,000,000 cu. yd. of ready-mixed concrete, with an estimated value of $40,000,000, was made in 1930. Because the product is perishable and the demand is variable, a considerable investment is required in order to take care of the big demands which must necessarily be made on time if satisfactory service is to be rendered. This investment, according to Mr. Thomson, ranges from about $3 to $5 per cu. yd. of the volume of concrete produced per year, with a resulting overhead of 50 c. or more per cu. yd. of concrete, which must be included in the price, if the producer is to get a return on his investment.

The irregularity of demand, or the low load factor as it might be termed, may be such as to make the average production only 30% or even less of the maximum production. The highest quality concrete produced in this way is the result of carefully designing the mix, selection of the proper aggregates, close proportioning and frequent testing of the raw materials and refinement in the manufacturing methods. Mr. Thomson could foresee a more general use of concrete

sold on a strength basis instead of the usual mix, although not very much has been accomplished along this line as yet.

E. R. Kinsey, president of the Board of Public Service, St. Louis, Mo., speaking on "Responsibility of the Aggregate Producer as Viewed by the Engineer," took quite as much credit for the quality of ready-mixed concrete in St. Louis as the manufacturer, because of the exceptionally careful designing, rigid specifications and inspection service.

Agricultural Limestone

J. R. Bent, director of the limestone and phosphate department of the Illinois Agricultural Association, speaking at the annual meeting of the National Agricultural Limestone Products Association, on "Some Current Aspects and Probable Future Developments in the Agricultural Limestone Project," gave a remarkably interesting, historical and philosophical review of agriculture as the corner stone of our national prosperity. Discussing the present situation of overproduction, he said that as a matter of fact, the actual overproduction was but 15% in excess of our domestic needs and that nearly all of this excess was in wheat, which is our one exportable grain. Other grains are affected in that in their use they are more or less interchangeable with wheat in domestic markets.

The problem of overproduction of manufactured products, Mr. Bent said, was relatively simple as compared with the farm overproduction problem, owing to the fact that manufacturers are relatively few and can in one way or another solve their problems by controlled production, but that the farmer had to contend with uncertainty of the weather, world-wide conditions and prospects, and a great many factors which were very difficult to determine and understand in advance of crop planting.

Such factors are the decreasing rate of increase in population, which, if it proceeds as at present, will place the population of this country at approximately 160,000,000, where it will remain practically stationary. On the other hand, the population of Russia is increasing rapidly so that Mr. Bent predicted it would within a few years absorb its own grain surplus, which is now such a disturbing element in international markets.

Another condition which affects agriculture which we seldom think of is the changing character of labor. With the application of more and more machinery, manual labor becomes less and less necessary, and with the decrease in heavy manual labor, there is less need and less demand for foods of the fuel type, and more demand for such foods as sugar, milk and other dairy products.

Mr. Bent said that there had been a slight gain in crop area since the war with a slight increase in per-acre yield, due to more efficient farming, and that the agricultural production per man was also increasing.

Speaking of the necessity for adequate soil building methods, which at the present time are none too popular, he said that a fertile soil was the most valuable asset of the nation, and that without the proper attention to the conservation of the soil, its fertility could be used up in the present generation, and that at the rate it is being tilled at the present time, there would be a tremendous loss of fertility.

The aim of soil building and the use of fertilization is not necessarily to increase production but to obtain greater production from the cultivation of fewer acres so that the land not needed for crops could be planted to self-reproducing legumes, which permanently improve the soil.

He said that producers of limestone should use their energies to get more sales, not merely for their own profit but because they were definitely and specifically aiding the public welfare and preserving agriculture for future generations. He said the real competition of limestone producers is not other producers of limestone but the manufacturers of some other product, be it radios or automobiles. In other words, competition is for the farmer's dollar, from a great variety of competitors.

ONE of the newer topics of discussion was that of ready-mixed concrete. It was estimated by one speaker that the business in this product throughout the country during 1930 amounted to $40,000,000, which of course is just a beginning in a line of production which is recognized as capable of development to many times that amount.

Too much emphasis, he thought, had been placed on neutralization of soil acidity in the sale of limestone, whereas the strongest sales argument that could be used for it, is the permanent upbuilding of soil fertility. He favored newspaper advertising and farm agency work along this line.

When the question was raised as to the size of limestone product desirable, Mr. Bent referred to his article in the Annual Review Issue of Rock Products, January 3, 1931, page 135, in which he has proposed a method of evaluating various limestones according to their screen analyses.

Specific Sales Methods

One whole session of the convention was devoted to a discussion of sales problems, under the chairmanship of **Paul B. Reinhold,** of Reinhold and Co., Inc., Pittsburgh, Penn., the industry's best known crushed stone broker and salesman.

E. T. Nettleton, sales manager, Connecticut Quarries Co., New Haven, Conn., spoke on the subject "Carrying Out of a Sales Program Through Central Office Control." He described quite fully how his company carries on its sales work and its advertising and the advertising methods used, consisting chiefly of some small amount of newspaper advertising, printed pamphlets prepared jointly for his company and the New Haven Trap Rock Co., and blotters sent out monthly to a mailing list of 2500 names of state, county, city and township officials, contractors, etc.

Moving pictures of the quarrying and crushing plant operations are also shown to meetings of engineers, contractors, taxpayers, etc., and have served both to advertise the product and to give the public a popular knowledge of its preparation and use.

The Connecticut company operates six quarries with a volume of about 800,000 tons per year. The salesmen give two days a week to schedule calls, and meetings are held weekly with the sales manager, at which all calls made in the interim are reported upon and discussed. The salesmen keep in touch with the construction jobs to see that the requirements are being fulfilled and also make such calls as may be desirable where collections are slow.

The salesmen are on salaries rather than commissions, as this has been found to work out the best.

Contrary to the practice of some other companies, in fact perhaps the majority of other crushed stone companies in the East, no cash discount is allowed, all prices being net 30 days.

In the discussion following Mr. Nettleton's paper, however, it seemed that most of those present were in favor of cash discounts of 5 or 10 c. per ton, which usually operate more as a penalty for non-payment rather than a discount. In other words, the operator figures on a net price plus the 5 or 10 c. for non-payment within 30 days. It was stated that the Pennsylvania contractors are in favor of the producers giving a 20 c. cash discount instead of 10 c., in order to help weed out the contractors who are financially unable to pay their bills promptly.

William E. Hilliard, general manager, the New Haven Trap Rock Co., New Haven, Conn., spoke on "The Management of Credit in the Stone Industry" and the importance of credit information and of good judgment in extending credit, based on character, capacity and capital, or the so-called three C's. Mr. Hilliard stressed the importance of all of these and especially the first, in assuming credit risks, with a middle ground probably the best course in most cases.

He looked for an advance in the use of credit information as essential to progress in the industry. Local credit bureaus already established seem to be the best means of obtaining credit information at the present time.

Col. E. J. McMahon, executive secretary of the St. Louis Quarrymen's Association, spoke on the subject "What Can a Local

Trade Association Do to Ethically Promote Sales?" He emphasized particularly in the case of his own association an increased use of stone and the greater sales volume resulting from the small amount of publicity and promotional work that a local organization like his was able to do. One of the things that his association has been called upon to do is to use its influence in legislative action on pending bills which would have adversely affected the quarry industry, the lowering of compensation insurance rates, with the resultant savings, the change from a volume to a weight basis of sales, help in simplifying aggregate specifications and help in increasing good building practice in the city as exemplified in the new booklet on the subject prepared by the Better Business Bureau of St. Louis and referred to in Rock Products of January 17, page 95. With specific relation to advertising, Colonel McMahon thought that in his own case, with such limited funds, simple direct-by-mail literature, mostly post cards, gave the best results for the investment.

Production

Classified under the subject of production are papers and discussions covering a variety of subjects—standardization of certain classes of equipment, management, cost accounting, accident prevention and standardization of the product itself.

Frank S. Jones, chairman of the committee on Standards (general superintendent of the General Crushed Stone Co., Easton, Penn.), reported that the sub-committee on standardization of well-drill equipment had done all that it had set out to do and consequently had outlived its usefulness. The committee was consequently discharged with the thanks of the Association for its accomplishment.

The sub-committee on Standardization of Quarry Equipment, under the chairmanship of **A. G. Seitz** (managing director, Central New York, General Crushed Stone Co., Syracuse, N. Y.) reported difficulty in interesting manufacturers of quarry equipment in the work and suggested that the committee endeavor to learn from the manufacturers of quarry equipment whether or not there are enough things of vital interest to make a continuance of this committee desirable.

Similarly the sub-committee on Standardization of Plant Equipment had made little progress as yet.

W. W. Duff, chairman of the sub-committee for Standardization of Drilling Equipment (vice-president and general manager of the Newcastle Lime and Stone Co., Newcastle, Penn.), advised that any attempt to standardize air-drill equipment, as had been proposed, would be a mere gesture on the part of the Association, as the drill manufacturers themselves had long had this matter under consideration and had gone as far as it was practically possible in such standardization, in their own estimation.

Chairman Duff found that well-drill equipment was generally lacking in proper guards to assure the safety of workers on well-drill machinery and has brought the matter to the attention of the Accident Prevention Committee of the Association.

John Rice, Jr., chairman of the sub-committee for the Standardization of Specifications on the Market of Supplies and Equipment (assistant to the vice-president, General Crushed Stone Co., Easton, Penn.) reported the progress of work with his committee in co-operation with the Washington office of the Association and the Federal Specifications Board, in which the number of manufacturers who furnish materials to the Government under the "Certification Plan" inaugurated by the Department of Commerce had expressed a willingness to make quotations to crushed stone producers under the same plan, but that the work of this committee in this regard was capable of considerable expansion.

THE active work which the association is doing in the standardization of processes and equipment was evidenced by the reports of the Committee on Standards and its several sub-committees. These committees are working in co-operation with the Federal Specifications Board as well as with standardization committees set up by various groups of manufacturers.

The suppliers of materials, from whom it is hoped to have complete lists, include babbitt metal manufacturers, paint manufacturers, etc. — manufacturers of commodities that are more or less already well standardized.

Operating Problems

L. D. Staplin (Carbonite Metal Co., Ltd., Chicago, Ill.) on the subject of "Crusher Bearings" delivered a most interesting paper on bearings and bearing metals, with special reference to gyratory and jaw crusher eccentrics.

According to Mr. Staplin the most important thing of all to insure freedom from bearing troubles is to make sure that the shaft is not scored and is not sprung, since a rough or sprung shaft is liable to cause trouble, no matter what bearing metal is used. A positive lubrication system is also essential, with proper oil grooves, to insure a supply of oil to the bearing surfaces at all times. Mr. Staplin stated that, contrary to rather general practice, oil grooves should not be placed in the load area of the bearing where they may help to keep the oil from covering the bearing surface, but should be on the unloaded side of the bearing from which the oil may be carried to the shaft.

The shape of the oil grooves was also stated to be of considerable importance, wide tapered grooves being preferable to narrow straight-sided grooves which have a greater tendency to wipe the oil from the shaft.

The kind of bearing metal to use depends (according to Mr. Staplin) on the hardness of the rock being crushed, the bearing pressures, condition of the shaft, etc.—hard tough metal being generally preferable to ordinary babbitt metal, since it will stand higher pressure without mashing and it will operate at higher temperatures. Ordinary babbitt metal, which it was stated could not be operated satisfactorily at temperatures above 160 deg. F., is considered to be preferable in the case of a sprung shaft, since it will more easily mold itself to conform to the required shape.

However, for all ordinary bearing cases where the shaft is true and smooth, Mr. Staplin considers that a hard tough bearing metal giving several times the length of service of ordinary babbitt metal is a very worth while investment.

Electric Power

J. E. Borland, general engineer of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., in a paper on "The Use of Electricity in the Handling of Stone," described the three common types of alternating current motors used in the crushed stone industry, their characteristics and their applications to various kinds of drives.

For ordinary drives not requiring a high starting torque, Mr. Borland explained that the squirrel-cage type of motor is most suitable, while a wound-rotor or so-called slip-ring type motor is desirable where the load is hard to start.

The synchronous type motor, especially useful in improving a bad power factor as well as having a high efficiency, has come into very general use where too much starting torque for a slip-ring motor is required, according to Mr. Borland.

A tendency is noted toward the more general use of high-torque and line-start motors. These are of the squirrel-cage type with a double-rotor winding, one winding having a high resistance and low reactance, and the other a low resistance and a high reactance, so designed as to give a high starting torque without unduly high starting currents,

at the same time having reasonable efficiencies. They may also be thrown directly on the line in starting, thus not requiring any compensators or other type of starting equipment.

Management

E. R. Kinsey, president of the board of public service, St. Louis, Mo., who is reported to have the supervision of spending around a million dollars per month on public works in St. Louis, in the paper entitled "Responsibility of the Aggregate Producer as Viewed by the Engineer," briefly reviewed conditions in St. Louis, but did not show that the aggregate producers' responsibility consisted of much more than strictly living up to very rigid specifications.

He introduced two of the assistant engineers of his department to elaborate on their methods of concrete design and control and they emphasized the exactness of their methods of design, taking into account the fineness modulus of the aggregate and the water-cement ratio and stated that uniformity in the aggregates was the chief requirement they insisted upon.

Psychiatry Applied to Management

Dr. H. S. Hulbert, psychiatrist, Chicago, Ill., whose very interesting and remarkable paper on the psychology of accidents at the Quarry Section meeting of the National Safety Council in Pittsburgh, September 30, was published in Rock Products, October 11, delivered a paper of similar character, but with more emphasis on the psychology of management under the title "Mental Self-Discipline Aids in Industry."

Dr. Hulbert spoke very frankly of the frailty of business men and explained in plain every-day language the practical application of psychiatric knowledge.

He began with the explanation of the classification of all humans into 15% sub-normal, 70% normal, and 15% above normal. The desire of every one, of course, is to be in the 70% normal class, as he explained the extremes at both ends of the scale inevitably tend to eliminate themselves.

He explained how the nervous system is very complex and in the history of evolution very new and crude for the burdens it is called upon to carry in the present day industrial life. The brain, of course, is part of the nervous system and the latest of all human acquisitions. He said the greatest difficulty comes from unraveling the connections between the conscious and the subconscious minds, and emphasized the part that emotion rather than reason plays in every-day life.

He described day dreaming as the most characteristic phenomenon of every day life and the effect of it on our lives. Day dreams are not helpful or desirable unless put into action; and according to Dr. Hulbert, every normal person should so far as he is able try to keep his mind "on what his hands are doing," as otherwise day dreams lead to self-consciousness, embarrassment and disappointment.

The following paragraph summarizes the main points:

"The world likes persons who react. The world likes persons who are agreeable and who produce. I do not know any other standards by which the world evaluates people. If you can't react because you day dream, if you can't produce because you don't start, if you are disagreeable because you are disappointed, thanks to your day dream, you have impaired your personality enormously by indulging in day dreams."

A LARGE number of superintendents of plants were in attendance at the convention and took particular interest in the operating problems discussed. Some valuable papers on various types of equipment were presented, serving to emphasize the technical work being done by manufacturers for the betterment of the stone industry.

More or less in the same class with day dreams are reveries, which were equally condemned as harmful.

Worry was another subject that he discussed in detail as the cause for much of our mental and physical inefficiency. "The antidote for worry is: do something about it. If you have a workman who is worried about the state of health of his wife who may be in the hospital, who is worried about how his little daughter is getting along at home cooking breakfast for the present baby, you should let him go to the 'phone two or three times a day and telephone the hospital and telephone home, because when he discharges worry, he can put his mind back on what his hands are working at."

The Part of Emotion

Another typical statement of Dr. Hulbert's follows: "The emotional life of an individual is much more important than the intellectual life of the same individual. And you must make use of that in handling other persons. And you should insulate and guard and protect your emotional life particularly carefully, much more so than you do your intellectual life."

He then illustrated this statement by examples of experiments on soldiers in hospitals during the war, emphasizing that happiness diminishes a sense of fatigue, while unhappiness increases it; that happiness increases speed of thought, and unhappiness slows up the speed of thought; that happiness increases accuracy and unhappiness increases inaccuracy.

His formula for the avoidance of emotional disturbances was in so far as possible to lead a normal life and build up a good measure of self-esteem on the basis of good health and an honest self evaluation. He said: "On the basis of good and improving health and honest self-evaluation, there develops, without further effort on the part of the individual, self-respect. A self-respecting person has the extra advantage of being well-respected by others, which is one of the best things in life. A self-respecting person naturally has respect for others, something which the cynics lack. A self-respecting person has respect for the rules of his group, conventions, if you want to call it that."

A Definition of Conscience

Dr. Hulbert made this very significant statement: "Although I am a minister's son, I dare to say that a modern interpretation of what we call conscience is respect for the rules in persons who are self-respecting. If you want the men in your plant to respect your company rules, you can't shame them into it. It doesn't work that way. You can get them to respect the rules by building up their self-respect."

Particular emphasis was laid on the necessity of normal and upright living in the attainment of self respect, and in the guarding of one's health. Dr. Hulbert said, "Nervous breakdown is a layman's term. It means an unexpected early breakdown in life. The most common cause of this condition is two factors acting on the same individual at the same time. One is that the individual is run down in health. And while in impaired health, a sudden emotional strain comes along. Had he been healthy he could have stood the strain. Had he been sick with no undue strain, he would not have broken down either. . . . You never know when a great emotional strain is going to come into your life, hardship, sickness, death, loss of position, or whatnot. So the only way you can prevent nervous breakdown is to see that you have at all times a surplus of health, not borderline health but abounding health. It is the duty of every person over forty to have an annual physical examination, which is a short thing and not expensive, to see that his health is not impaired in the least."

Hints for Handling Others

More specifically regarding the handling of others, he had the following suggestions to make:

"When you must criticize a person to his face, see to it that you say something good about him and something bad about him at the same time. You must differentiate the offense from the offender. No person is wholly bad. You cannot totally condemn any individual. . . . That is the way you should train your foremen to handle men when they have to criticize them. You can't say to a man, nor let your foreman say, 'Why Oscar, you damn big Swede, what the hell did you do this for?' No, you can teach him to say something like this: 'Why, Oscar, I have noticed you for the last ten years. You never come in drunk on Monday morning and you are practically never late, and here you make a mistake like this. What the hell?'

"And Oscar will go home and tell his wife that the company has noticed that he was never late and never drunk, and he will work hard for the company. He wants to live up to their good opinion of him. And he'll never say a word about the mistake he made. He will try to live that down, and that is what you and your superintendents and foremen want (isn't it?) to get men to quit making their mistakes."

Another point Dr. Hulbert made was that in handling one's self and in handling others, comparisons are bad. "They are not stimulating," he said. "They are harmful. We often say to a person, 'Why don't you do as well as so and so,' thinking it will stimulate this chap to do better. It does not. We make him do poorer.

"It is hard for us to understand, but let me give you a home-made example: Suppose there has been a little snowfall during the night. The wife will say to her husband while he shaves, 'Why don't you shovel your sidewalks as well as Joe Hammerly does? And he lives on a corner and he has two sides to shovel.' She thinks that by making a comparison she is helping matters along. But she isn't. This is what happens: 'Well, if she wanted to marry a champion snow shoveler, why didn't she marry a white wing?' That is first, and then the next thing he hates Joe Hammerly, his neighbor, and then he says, 'She isn't such a much either,' and he begins to find fault in his mind, whether he says it out loud or not. And he goes out and shovels the snow and hates it and he hates house work and in the spring he'll hate gardening, and he shakes down the furnace and probably breaks the grate.

"What has she gained by making a specific comparison? Nothing. And you never do unless the individual invites comparison by entering a race. What she can do with propriety is to compare him with the average of his subdivision. A specific comparison hurts."

Avoid Giving Anxiety or Fear

Another part of our emotional life that Dr. Hulbert described in some detail was anxiety and fear, emphasizing that fear no longer should be a factor in handling men, and that a foreman of whom everybody is afraid should have some other job. The majority of persons crave certitude and cannot stand uncertainty.

Of anger he described two types, the first type being quickly dismissed and described as an increase in irritability. If irritability continues, he said that in practically every case the cause is a physical one and its cure should be sought. For instance, a tooth-ache, cramps, Bright's disease, or some other internal trouble. Temporary irritability or anger, according to Dr. Hulbert, is not a bad trait, since the most valuable members of society often come from irritable families. Such children are fighters, but learn to civilize their primitive instincts as they grow older and their irritability crystallizes into determination to accomplish their objectives at all cost. This, he said, is civilized anger, the primitive form being to destroy the person who puts obstacles in your path, which doesn't lead to anything but a fight.

STUDY of the human element was given considerable attention, from the standpoint of more efficient production as well as the prevention of accidents. One of the interesting papers of the session was devoted to the psychology of the handling of labor, emphasizing the attention which should be given to the development of self-respect on the part of the employe.

Part of his talk was devoted to illustrations of building up the character of one's employes and associates through building up self-reliance and self-respect. He emphasized the necessity always in any case of doubt to assume the best about oneself and to allow even the office boy to make decisions for himself.

Summing up, Dr. Hulbert said: "Although there is a great difference bebetween men, yet there is a pattern which we tend to follow and we sometimes make mistakes. Man has the greatest opportunity of success of all living forms of life because his brain is large in proportion and the purpose of the brain is to adapt oneself to the changes in one's environment. As the environment is always changing—good times, hard times, sickness and health at home—clear thinking will help to adapt oneself to this environment."

Accident Prevention

A. L. Worthen, chairman of the committee on Accident Prevention (vice-president of the Connecticut Quarries Co., Inc., New Haven, Conn.) reported the rapid growth of the Quarry Section of the National Safety Council, which has 38 members from the National Crushed Stone Association. He also spoke of the progress made in first-aid training under the supervision of the U. S. Bureau of Mines; and ended with the recommendation that as soon as the income of the Association is sufficient to warrant the expenditure, some consideration be given to the advisability of employing a man who will devote his entire time to organizing and supervising proper accident prevention methods among the members of the Association. The saving, he said, to the industry would be many times the cost of the services of such a man and would represent a tangible benefit to be derived from association membership.

T. J. Quigley, chief, Mines and Quarries Section, Department of Labor and Industry, Harrisburg, Penn., discussed the growth of accident prevention in the portland cement industry from small beginnings to the remarkable record made in 1930, and also emphasized the great progress made in four years in the state of Pennsylvania, since active attention has been paid to accident prevention in quarries.

He mentioned specifically the record of the J. E. Baker Co., York, Penn., as typical of the old-time conservative management. This company did not begin accident prevention until 1928. In 1927 it had 307 accidents; in 1928, 140; in 1929, 58; and in 1930, 12 accidents. And in 1930 three of its eight quarries operated without any lost-time accidents whatsoever.

He again emphasized the point made in his address to the Quarry Section of the National Safety Council at Pittsburgh, Penn., in September, that quarry owners should insist upon discrimination in insurance rates based on their accident record.

Five Classifications of Quarries

He proposed five classifications of quarries: (1) those having less than 2% lost-time accidents; (2) those having less than 5%; (3) those having less than 8%; (4) those having less than 12%; (5) those having over 12% lost-time accidents.

He suggested that in view of the large number of quarries which are now able to go through a year without a lost-time accident that some sort of a special trophy for a five-year no accident record be set up, and stated that Senator David B. Reed of Pennsylvania would soon introduce in the U. S.

Senate a bill to appropriate $10,000 for quarry trophies for five-year no accident records and urged that the members of the Association write their senators and representatives in congress urging the adoption of this bill.

Trophy Awards

W. W. Adams, U. S. Bureau of Mines, presented the trophies for the year 1929, the first going to the Cape Girardeau quarry of the Marquette Cement Mfg. Co., M. P. Greer of the company being there to receive the tablet, donated by the *Explosives Engineer.*

Another trophy was awarded to the Louisville Cement Co. for a five-year no accident record in the form of a silver loving cup, J. M. Buchheit of the cement company being present to receive it. Mr. Buchheit in accepting the trophy mentioned with considerable concern the fact that an accident in August, 1930, had spoiled their very long no accident record. He laid it to the nervous breakdown of a workman, who he subsequently learned was taking care of a sick wife and consequently was suffering from anxiety. This man was a member of a section crew and was run down by the shovel and permanently crippled. He had gone after a drink of water and his thoughts were apparently far afield.

Mr. Buchheit emphasized that this was a lesson for the foreman to find out in the future all about such home troubles and to make sure that men who were suffering from such troubles were properly taken care of; that it was the duty of the foreman to be such a man's best friend. He also said that we must never get in a state of complacency where we think we just can't have an accident or we will be sure to have one.

Cost Keeping

H. H. Cartwright, chairman of the committee on Cost Keeping for the Association, submitted a report of the work, together with a manual on uniform cost keeping compiled with the help of J. R. Thoenen of the U. S. Bureau of Mines, an outline of which is shown herewith in graphic form. The object of this cost system is to make it so simple as to be adaptable to the smallest plant and yet capable of expansion to include the most minute detail that any company would wish to use. A study of the chart will illustrate this.

Standardization of Crushed Stone

An item which should have been considered under "Production" is the progress in standardization of the product. This was reported on by **A. T. Goldbeck,** chairman of the sub-committee for the Standardization of Commercial Sizes of Crushed Stone.

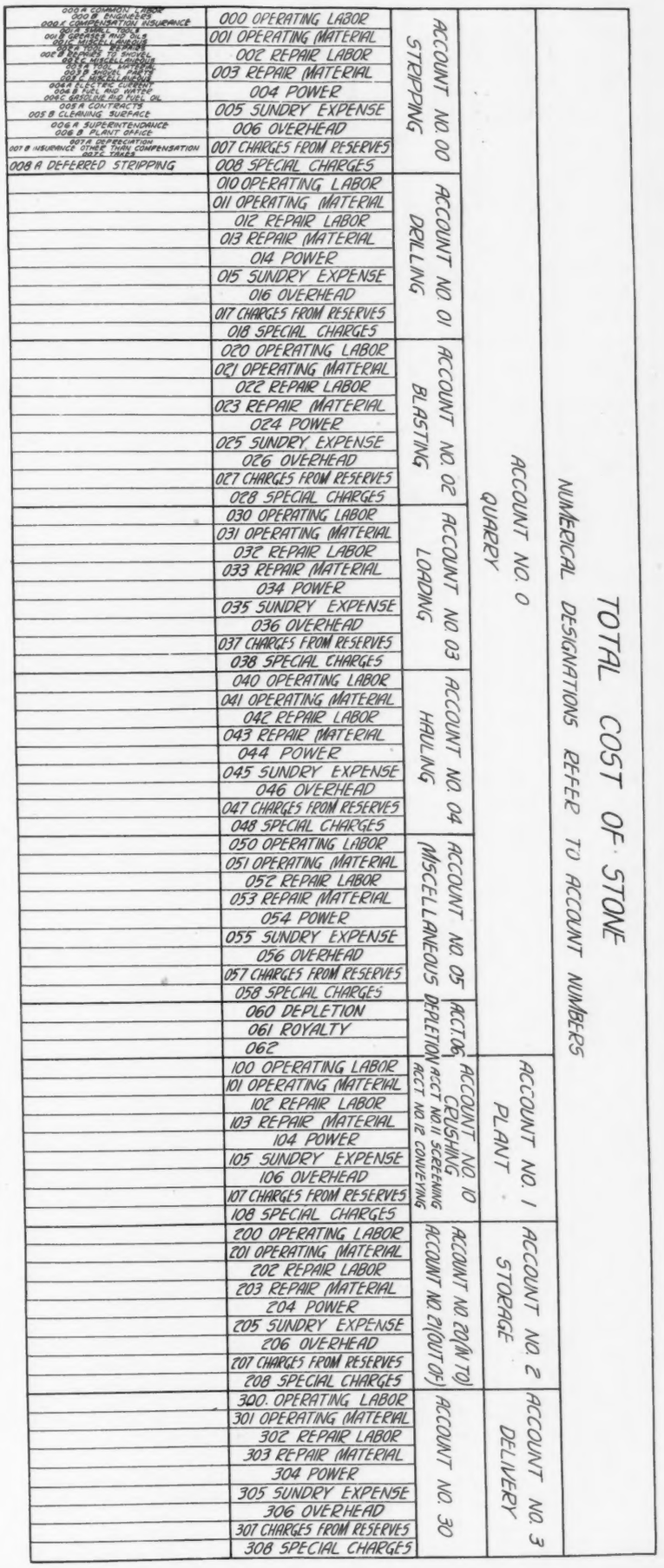


Diagram of plan for uniform cost keeping presented by H. H. Cartwright, committee chairman

The proposed standard sizes were reported at the annual convention a year ago, stated in terms of round opening screens:

0 — ¼-in.
0 — ¾-in.
¼— ½-in.
¼— ¾-in.
¼—1¼-in.
¼—2½-in.
¾—1¼-in.
1¼—2½-in.
2½—3½ or 4 in.

All other sizes in addition to the above would have to be designated as "Special Sizes."

Mr. Goldbeck said that practically no criticisms had been received in regard to the proposed standards. He said that standardization of sizes of crushed stone throughout the United States can best be brought about through the offices of the Division of Simplified Practice of the United States Department of Commerce. The producers alone can not standardize the sizes of crushed stone because consumers are interested in this subject also and hence standardization can be brought about only by the cooperative effort of every one concerned. Further, the standardization of sizes is of interest, not only to the crushed stone industry, but to the crushed slag and to the gravel industries, as well. Neither the slag nor the gravel industry thus far has set up any standard through the Division of Simplified Practice, although the initial steps have been taken.

It would be desirable if size standards were set up for all three aggregates simultaneously. The representatives from all three industries agreed that in the statement of sizes square opening sieves should be used rather than round opening screens. The lack of agreement on the shape of opening in the laboratory screens to be used for the measurement of size of aggregate has been an exceedingly important factor in preventing an earlier size standardization and it is hoped that there will be universal agreement on the use of square mesh sieves for size measurement.

The sizes stated in terms of square opening sieves finally agreed to for the purpose of discussion by the representatives of the three aggregate industries are as follows:

0—No. 4 mesh
No. 4—1½-in.
No. 4— ¾-in.
No. 4—1 -in.
No. 4— ½-in.
No. 4—2 -in.
½—1 -in.
¾—1½-in.
1½—2½-in.
1 —2 -in.
2 —3½-in.

Mr. Goldbeck stated that it should be emphasized that these sizes were agreed to by compromise, merely for the purpose of having something to propose to all three industries, subject to their approval as a possible standard. It is believed that these sizes take care of all types of construction for which crushed stone is used.

Prevention of Segregation

E. R. Morgan, of the Robins Conveying Belt Co., New York City, read a paper on the prevention of segregation of aggregates and breakage in bins, in the absence of the inventor, Major Henry Adams. This paper, in connection with models in the exhibitors' section, showed the construction and operation of the "Adams" withdrawal chute for use in emptying bins, the "avalanche" type of chute for filling bins without breakage, and the "Adams" floating chute for loading railway cars from bins. The models (with glass side) of both the "Adams" withdrawal chute and an ordinary bottom bin gate showed very clearly the action of the stone in each case, and also the action of the "avalanche" type chute for filling bins or making storage piles. These were described in Rock Products, January 17, 1931, in a general article on segregation devices.

STANDARDIZATION of crushed stone and the scientific regulation of its sizes were discussed from the standpoints of the engineer, the machinery manufacturer and the practical plant operator, and several additional refinements were suggested for meeting requirements more exactly.

The floating chute for car loading consists of a closed spout with outlet gate which may be lowered to the car floor and then raised as the car is loaded. It is connected with the side of a bin so that there is sufficient head room and clearance for raising it out of the way of cars or locomotives when not in use. The car must be moved during the loading operation.

Research

Research received a considerable amount of attention at the convention as it has, of course, become a very important factor in the association's work.

H. F. Gonnerman, manager of the research laboratory of the Portland Cement Association, Chicago, delivered a most interesting paper, illustrated with lantern slides, on the research work of the Portland Cement Association to determine the durability of concrete. The results of various freezing and thawing tests and sodium sulphate disintegration tests conducted on different concretes and aggregates were given, and also pictures were shown of the way in which concrete masonry wall units are being tested to determine their resistance to fire or excessive heat.

According to Mr. Gonnerman, the sodium sulphate tests, which are much more severe than the freezing and thawing tests, are not always conclusive, in that aggregates and concretes which are not seriously affected by freezing and thawing tests, are in some cases badly disintegrated by sodium sulphate tests. All of the tests indicated that the quality and amount of cement paste used was the most important factor in the making of good concrete, although grading and proportioning of the aggregates as well as cleanliness and freedom from impurities are also important.

The lantern slides showing the results of disintegration tests by freezing and thawing on concrete composed of various aggregates and with varying water-cement ratios indicated very clearly the importance of a low water-cement ratio.

According to Mr. Gonnerman, shales and cherts were the most injurious impurities in the order named. The importance of good workmanship as well as good materials was also brought out.

Mr. Gonnerman pointed out the joint responsibility of aggregate producers for research work in concrete. He said: "The solving of problems relating to the durability of concrete should not rest alone on the shoulders of the cement manufacturers, even though by their slogan 'Concrete for Permanence' they may have invited such responsibility. Aggregate producers must assume some of this responsibility, and we interpret this new activity on the part of the National Crushed Stone Association and similar organizations representing aggregate producers as a recognition of their willingness to share this responsibility."

Fine Aggregate

In view of certain faults found in pavements in an eastern state which is popularly blamed on the fine aggregate, Mr. Gonnerman's remarks on sand are particularly interesting. He said:

"In the case of the fine aggregates, the grading of the particles as well as their other characteristics seemed to have a great influence on the behavior of the mortar cubes when subjected to freezing and thawing. To make a mortar of a given degree of resistance, each sand was limited to a definite maximum permissible water-cement ratio. Some of the structurally sound sands, because of their fineness, had such high water requirements that they would not make durable concrete if used in the usual

CONVENTION CELEBRITIES
Sketched From Life
CAN YOU NAME THEM?

arbitrary proportions. Other of the sands were well graded but actually produced mortars which were lacking in durability because of the structural weakness of many of the particles. Gradings which produced harsh mixtures resulted in mortars having low resistance to freezing, due probably to the presence of air and water pockets.

"The sands were examined under the microscope and a count made of the suspected non-durable particles each contained. The data thus obtained were compared with the behavior of the sands in the soundness tests and in the mortar cubes. Similarly the behavior of the coarse aggregates in the soundness tests was compared with their behavior in the concrete cubes. It appears that the most injurious of the non-durable materials is shale. Shale when present in sands in quantities greater than about 3% produced a mortar having relatively poor resistance to freezing even though the sands were well graded. Some sands were found to contain as much as 30% of shale."

Mr. Gonnerman stated that thus far no really definite relationship had been found between the results of soundness tests on aggregates alone and their behavior upon exposure to alternate freezing and thawing in mortar or concrete. In other words, it is not possible yet to predict definitely the behavior of an aggregate in concrete or mortar from its behavior in any soundness test of the aggregate itself. Much appears to depend on the physical structure and mineralogical composition of the aggregate tested.

Clean Aggregate Important

Mr. Gonnerman also emphasized cleanliness as well as soundness of aggregates and stated that an examination of sources of supply in certain localities showed some plants do little, if any, stripping, but attempt to remove the overburden of silt, loam and clay at the washing plant. He said it had been their experience that so-called crusher dust is frequently the overburden which, during wet weather, adheres to the particles. Dirty and coated aggregates are to be avoided under all conditions.

He said that of 24 samples of crushed stone aggregate tested in one part of this general investigation, only three were judged to be lacking in durability. These latter contained waterlime, fine grained argillaceous sandstone and shale, or bituminous shale limestone.

Cement Paste Most Important Factor

His conclusions were: "The most important factor affecting the durability of concrete is the quality of the cement-water paste which provides protection to the aggregate. Improper grading, improperly proportioned mixtures, improper curing and dirty material are important factors which affect the quality of the paste and therefore the durability of the concrete. However, for the severest exposures, some materials require a better quality of protective paste than others, while some, especially those containing easily weatherable shale, are so harmful as to make their protection impossible or impracticable and they should, therefore, not be used. Soundness tests made directly on the aggregate serve to indicate the possibilities of the material, but as yet cannot be taken to measure definitely its ability to produce a permanent concrete.

"The responsibility of the aggregate producer in the attainment of durable concrete is to see that his product is clean, properly graded and reasonably free from those materials which have been pointed out as likely to be harmful. The responsibility of the cement manufacturer is to furnish cement of the proper quality. Given satisfactory materials, it is then the responsibility of the architect, engineer and contractor to obtain such quality of workmanship in the manufacture of the concrete that its permanence under the given conditions of use will be assured."

THE convention had, as always, the helpful co-operation of the Portland Cement Association, represented in particular by Mr. Gonnerman, manager of the research laboratory. He discussed some of the aggregate problems which have recently been given considerable attention, such as freezing and thawing, the use of crusher dust, and the action of various limestones in concrete mixes.

Association Research

A. T. Goldbeck, reporting on the research work done by the National Crushed Stone Association, also illustrated his resumé by the use of lantern slides. This was covered somewhat in the article by Mr. Goldbeck in the January 17 issue of Rock Products and will not be gone into in detail here.

He said that tests of concrete made with aggregates containing flat and elongated pieces (up to 15% of the total) showed that such pieces did not affect the workability or strength, but that poor workability or strength was due instead to improper proportioning of the aggregates or to insufficient or faulty cement paste.

It was also determined that dust on the aggregate within ordinary limits (or up to 5%) did not lower the strength of concretes made from such aggregates.

Freezing and thawing tests on concrete and also on mortars confirmed the results of Mr. Gonnerman's tests, that proper cement pastes of low water content are of the greatest importance, the illustrations indicating clearly that with high water-cement ratios the mortar disintegrated first leaving the aggregates intact.

J. W. Stull, chairman of the committee on Research (and president of the Liberty Lime and Stone Corp., Rocky Point, Va.), was unable personally to present his report of the work of the research committee of the association, but it was read by Mr. Goldbeck.

Some 38 research projects are suggested for investigation and the action of the convention was to endorse a larger appropriation for the research division of the association.

Economics

Under the general subject of economics, perhaps the most important was the paper of **Harold Williams,** attorney-at-law, Boston, Mass., on "Some Legal Aspects of Proration." Mr. Williams' paper dealt largely with over-production in the crude oil industry and the legitimate methods which have been undertaken to reduce it. The details of the petroleum control he gave as follows:

"With the aid of the American Petroleum Institute, and a voluntary committee of five, the Oil Conservation Board has periodically published information as to probable future demand, estimated necessary production and reasonable allocation of requirements between the larger producing states."

Proration in the Petroleum Industry

"Proration within the states has been brought about under state conservation statutes, the conservation of the natural resources of a state being peculiarly a matter of the sovereign police power of the states. Under the various state statutes elaborate systems of regulation have been evolved and it may fairly be said that proration in the oil industry is an accomplished fact."

While the methods of the oil industry may or may not be practicable as regards the control of production of such a commodity as crushed stone, Mr. Williams said there are two main legal problems involved.

"First, how far can a state limit the production of raw materials on the theory of conservation of natural resources, and not come into conflict with the constitutional prohibitions against taking private property without due process of law, and denial of the equal protection of the law."

State conservation laws have been

held constitutional in Oklahoma and California, but the United States Supreme Court as yet has not been called upon to interpret the constitutionality of these statutes directly, but cases are pending in the United States courts in Texas and Oklahoma which, Mr. Williams said, will probably find their way to the United States Supreme Court, and that until this tribunal deals with the subject, it seems likely that oil proration will continue to exist under the protection of state conservation laws.

Agreements to Limit Production of Doubtful Legality

"The second and more important legal problem," Mr. Williams said, "concerns agreements and understandings within the industry to bring about proration. How far is it legal for associations or business groups to make agreements to limit production of a necessary raw material? Production is not commerce, but it may affect commerce. The Federal anti-trust laws forbid unreasonable restraint of interstate commerce. Certain sorts of agreements such as those fixing prices are held contrary to law, whether in fact the prices agreed on are reasonable or not. Agreements to restrict output would probably be considered illegal even though reasonable, unless they were justified strictly as conservation measures which affected or limited interstate commerce merely as an incident. Even contracts among adjoining owners of oil land for unit operation of oil pools were regarded by the Federal Oil Conservation Board and a committee of the American Bar Association investigating the subject for them as of such doubtful nature that specific legislation was recommended to exempt them from the operation of the anti-trust laws."

"Obviously," Mr. Williams continued, "it is doubtful whether concerted curtailment of output can safely be carried on under the guise of conservation with the anti-trust laws as they are today."

Can Proration Be Applied to Crushed Stone?

Referring specifically to the quarry industry, Mr. Williams said: "In any business such as the production of crushed stone, it would presumably be difficult to establish the fact that overproduction, however disastrous economically, tends to produce actual physical waste. The extent, if any, to which crushed stone piled on the surface of the ground is subject to deterioration or shrinkage, is a matter which you yourselves are best qualified to determine. Probably too, the potential supply of crushed stone is so vast that there is no practical need of measures to conserve it.

"It would, therefore, seem unsafe to rely on the doctrine of conservation as a sound basis for economic relief of such an industry."

Anti-Trust Law Amendments

In discussing any amendment of the anti-trust law, Mr. Williams said: "It would be wiser not to rely upon the doubtful protection of the principle of conservation but to advocate frankly the recognition in our statute law of the growing sentiment that there is a public interest in the preservation of those complex industrial structures that are the greatest expression of our national genius; a public interest outweighing in permanent common advantage any temporary benefit to be derived from the opportunity of buying in markets shattered by abnormal competition."

Mr. Williams stated further: "If any wide and inclusive measure of relief is to result, it should not be confined within the comparatively narrow scope of conservation of natural resources, but should be based upon the broader principle that there is no constitutional right to buy below cost; that the immense aggregations of capital invested in organized business have a right to the fair and reasonable return without which business cannot continue to exist; that the people, both as wage-earners and consumers are vitally concerned in the stabilization of industrial conditions; and therefore that legitimate industry should be entitled to take reasonable co-operative steps to protect itself from the evils of excessive competition in times of extreme over-production.

IN seasons of under-consumption such as that through which we have just passed, the question of limitation of production and the pro-rating of business is likely to come up. The legal aspects of such a plan were discussed by a Boston attorney, who said that action within an industry must be entirely voluntary and without suspicion of coercion, something rather difficult to achieve.

"The exact form which such legislative relief should assume is a question which calls for deep study and thought on the part of those charged with the responsibility of enacting it. It has been suggested that some sort of industrial tribunal should be created with authority to pass upon and sanction agreements of this character, where the rights of the public were not invaded. It would be presumptuous to attempt here to prescribe or define a remedy, but it may not be impertinent to touch upon some of the general principles which should enter into any consideration of the question. In considering any amendment to the anti-trust laws, it must constantly be borne in mind that the people as a whole have a vital interest in agreements affecting or limiting free competition and that if such agreements are to be made permissible, they will have to be subject to some degree of governmental regulation and control. There is always the danger that the price of governmental aid may be governmental intrusion and supervision. There is, on the other hand, a healthy tendency to allow business to regulate itself, such as is manifested by the attitude of the Federal Trade Commission toward trade associations.

Public Protected by Voluntary Co-operation of Producers

"Action within the industry must of course be voluntary and without suspicion of any coercion, and voluntary co-operative action in most industries is extremely hard to achieve, except where conditions are grave enough to bring about an almost unanimous sentiment. This circumstance alone would operate to protect the public from any harmful combination to restrain competition unduly, and would automatically limit concerted effort by any industry to defensive measures of protection in times of stress.

"All this may appear to be of no immediate concern to the crushed stone industry which has its own unique problems, but the time may come when it might be desirable to combine not to raise prices, but to uphold them above the level of disaster. Should Congress act at all, it is essential that its action shall be comprehensive enough to include all raw material production. If industry is to be given greater latitude, then to insure the minimum of official intervention, such self regulation within the industry must be broad gaged enough to recognize that the welfare of business is in the long run identical with the welfare of the whole consuming public, upon which success of business depends.

"Any amendment to the anti-trust laws should therefore be permissive in its nature, and leaving the initiative to the councils of business where it properly belongs, and reserving to the agencies of government the necessary function of approval and veto. Legislation along such lines would constitute the Federal Government an aid rather than a check upon legitimate business enterprise."

Mr. Williams incidentally is largely the author of the resolution which we have quoted earlier in our report, recommending revision of the anti-trust laws, and his paper which we have par-

tially quoted is a remarkably clear and interesting exposition of a very complex subject.

Report on Trade Practice Rules

Otho M. Graves, chairman of the committee on Interpretation of Trade Practice Rules, reported that the committee had purposely avoided calling itself by the term generally applied in other associations, namely, "Enforcement Committee," because it is not the purpose of the committee to have to use any police power, but rather use its energies to avoid misunderstandings, to clear disagreements and to harmonize discordant points of view.

Mr. Graves said in conclusion, "We do not look on it as an enforcement committee. It could become that in cases of dire necessity. But it isn't that now. Where questions arise, it is merely to interpret the spirit and intent, in so far as it can, of the trade practice resolutions, with the hope that the more clearly those resolutions are understood and the more completely each of us lives up to their spirit, the better it will be for the industry, the happier we will all be and the more prosperous we will all be."

Taxation

Dr. Wm. B. G. Gitteau, collector of Internal Revenue, Toledo, Ohio, former executive secretary of the Ohio Crushed Stone Association, spoke on the subject of taxation and transportation. He gave a very comprehensive history of the scheme of road construction as practiced in Ohio and in cities throughout the United States generally, where a large part of the cost of pavements is assessed against abutting property. He emphasized the point that the great need of present times is large mileage of low cost roads and urged conservation of investment in present pavements as a real issue.

He urged every intelligent citizen to take more active interest in the subject of taxation, which he pointed out is growing by leaps and bounds, until one-seventh of our entire national income is now devoted to governmental purposes.

Rate Making

Edwin C. Brooker, commerce counsel, Washington, D. C., discussed the subject "Rates and Rate Making" particularly as it applies to crushed stone and related commodities, in a very clear and comprehensive manner. Following are some of the highlights of his paper:

It is the duty of shippers of crushed stone to see that the consumers do not have to pay more than just and reasonable rates and to that end they should co-operate to see that proper levels are established and applied. In making rates, certain fundamental transportation factors enter into consideration which are, according to Mr. Brooker: (1) nature and value of the commodity as it affects carrier's risk in handling and what the traffic will bear; (2) susceptibility to damage or loss in transit as it affects carrier's risk in handling: (3) average loading of the commodity, and (4) volume of the traffic.

Crushed stone, together with sand, gravel, slag, etc., is one of the lowest value commodities offered to the carriers for transportation, and cannot move except at low rates because freight rates in numerous cases exceed the value of the commodity f.o.b. shipping point. Moreover it is a commodity that moves exclusively in open-top cars and consequently is not subject to damage or loss in transit as is the case with other commodities; and it is a very heavy loading commodity, the average being in excess of the marked capacity of the car, generally about 55 tons per car.

FREIGHT rates came in for their annual "once over" and the topic was of particular interest this year in view of the systematic effort being made to reduce costs on all lines. Taxation was another topic which can be included in this general class.

Mr. Brooker brought out that the indirect cost to a railroad in handling a car is the same, irrespective of the load, and only in the case of crushed stone the car is fully loaded, and that less dead weight is involved than in the case of lighter commodities, all of which makes for a less cost per ton of material handled, and that the handling turnover is quicker than in the case of many other commodities. Mr. Brooker further pointed out that the tendency was towards uniform rates on a mileage basis and that in many cases stone is paying more than its share. In the general revisions now under way he suggested the co-operation of the traffic bureaus of all the associations representing shippers of these bulk commodities.

Mr. Brooker's paper is so complete in its description of the fundamentals of rate making—and the subject is so much alive at the present moment due to the very comprehensive investigation of sand rates now under way, a report of which is published elsewhere in this issue, because of its relation to rates on crushed stone, sand and gravel, and slag—that it will be published in full.

General Business—New Officers

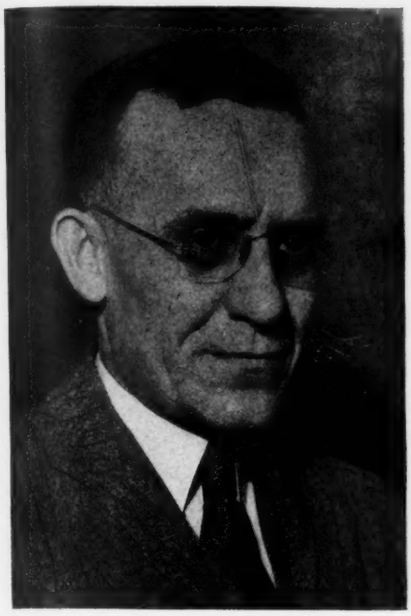
As already noted in our headline, Albert L. Worthen, vice-president of the Connecticut Quarries Co., Inc., New Haven, Conn., was elected president. Regional vice-presidents were elected as follows: C. M. Doolittle (Canadian), Hamilton, Ont.; A. J. Wilson (Western), Watsonville, Calif.; E. Eikel (Southwestern), New Braunfels, Tex.; A. S. Lane (Eastern), Meriden, Conn.; H. E. Bair (Central), Toledo, Ohio; W. R. Sanborn (Northern), Kankakee, Ill.; T. I. Weston (Southern), Columbia, S. C., and Porter W. Yett (Northwestern), Portland, Ore. Board of directors was elected as follows: Max A. Altgeld, New Braunfels, Tex.; W. M. Andrews, Youngstown, Ohio; H. E. Bair, Toledo, Ohio; H. E. Billman, St. Louis, Mo.; A. J. Blair, Milwaukee, Wis.; L. J. Boxley, Roanoke, Va.; C. D. Brewer, Duluth, Minn.; L. R. Cartwright, Indianapolis, Ind.; O. P. Chamberlain, Chicago, Ill.; J. E. Cushing, Schenectady, N. Y.; C. M. Doolittle, Hamilton, Ont.; F. O. Earnshaw, Youngstown, Ohio; E. Eikel, New Braunfels, Tex.; Otho M. Graves, Easton, Penn.; F. T. Gucker, Norristown, Penn.; J. L. Heimlich, LeRoy, N. Y.; W. E. Hilliard, New Haven, Conn.; W. P. Hodgkins, Chicago, Ill.; E. J. Krause, St. Louis, Mo.; A. S. Lane, Meriden, Conn.; Thomas McCroskey, Knoxville, Tenn.; B. A. McKinney, West Roxbury, Mass.; F. R. Patterson, Findlay, Ohio; John Prince, Kansas City, Mo.; Russell Rarey, Columbus, Ohio; John Rice, Easton, Penn.; J. A. Rigg, Alderson, W. Va.; H. E. Rodes, Nashville, Tenn.; W. R. Sanborn, Kankakee, Ill.; James Savage, Buffalo, N. Y.; F. W. Schmidt, Jr., Morristown, N. J.; J. F. Schroeder, Davenport, Iowa; H. M. Sharp, Toledo, Ohio; W. L. Sporborg, Syracuse, N. Y.; J. W. Stull, Rocky Point, Va.; Mortimer Wandell, New York City; T. I. Weston, Columbia, S. C.; G. J. Whelan, Cleveland, Ohio; A. J. Wilson, Watsonville, Calif.; A. L. Worthen, New Haven, Conn.; W. F. Wise, Dallas, Tex., and Porter W. Yett, Portland, Ore. Representing the Manufacturers' Division on the board of directors: Bruce Shotton, Hendrick Manufacturing Co., Carbondale, Penn., chairman of the Manufacturers' Division; H. M. Davison, Harnischfeger Corp., Milwaukee, Wis., retiring chairman, and Max S. Lambert, Robins Conveying Belt Co., New York City.

In addition to the customary resolutions thanking the hotel, mayor, local reception committee, etc., and in addition to the resolutions suggesting revision of the federal anti-trust laws, which we have already noted, a resolution was adopted commending the United States Bureau of Mines for the work it has done on behalf of the nonmetallic industries, and suggesting that this work be extended and the bureau given an added appropriation to take care of it.

Exhibit

The exhibit was larger than usual, 100 spaces having been sold. The list of these exhibits and the exhibitors is given on another page.

Again this year a loving cup, suitably inscribed, was awarded to the exhibitor



Bruce G. Shotton, elected chairman of Manufacturers' Division

with the best exhibit as expressed by vote of members visiting the exhibits.

The working model exhibit of the Nordberg Manufacturing Co. was awarded the loving cup. Allis-Chalmers Manufacturing Co. and Illinois Powder Manufacturing Co. were given first honorable mention and the exhibits of General Electric Co. and Robins Conveying Belt Co., second mention.

Prize Contest for Active Members

Prizes were awarded to ten of the active members for turning in completed cards. The winners were: W. B. Paynter, Kentucky-Virginia Stone Co.; J. F. Robinson, Cedar Bluff Quarry Co.; J. A. Hipple, Penn Lime, Stone and Cement Co.; F. B. Kimball, Connecticut Quarries Co., Inc.; E. Keim, John T. Dyer Quarry Co.; H. A. Rowan, John T. Dyer Quarry Co.; D. C. Hickey, General Crushed Stone Co.; R. P. Esser, National Lime and Stone Co.; R. D. Brewer, Connecticut Quarries Co., Inc., and C. Knoblauch, National Lime and Stone Co.

New Officers of Manufacturers' Division

The annual business meeting of the Manufacturers' Division was held after a dinner on January 20. The following officers and directors were elected: Chairman, Bruce G. Shotton, Hendrick Manufacturing Co., Pittsburgh, Penn.; vice-chairman, Abe Goldberg, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.; Thomas MacLachlan, Vulcan Iron Works, New York City; C. S. Huntington, Link-Belt Co., Chicago, Ill.; Lucius Beebe, Troco Lubricating Co., Philadelphia, Penn., and L. W. Shugg, General Electric Co., Schenectady, N. Y. The new board of directors elected (besides the officers already mentioned) is as follows: R. E. Brooks, National Equipment Corp., Milwaukee, Wis.; C. H. Adamson, Stephens-Adamson Manufacturing Co., Aurora, Ill.; L. D. Hudson, Nordberg Manufacturing Co., Milwaukee, Wis.; Gordon Buchanan, C. G. Buchanan Co., New York City; T. I. Edwards, Chicago Pneumatic Tool Co., New York City; J. C. Farrell, Easton Car and Construction Co., Easton, Penn.; E. L. Wettlaufer, Niagara Concrete Mixer Co., Buffalo, N. Y.; H. T. Gracely, Marion Steam Shovel Co., Marion, Ohio; F. E. Woodford, Woodford Engineering Co., Chicago, Ill.; W. H. Milroy, Earle C. Bacon, Inc., New Haven, Conn.; M. S. Lambert, Robins Conveying Belt Co., Chicago, Ill.; W. S. Nicol, Cross Engineering Co., Carbondale, Penn.; C. A. Riggs, Loomis-Machine Co., Tiffin, Ohio; E. C. Bauer, Kensington Steel Co., Chicago, Ill.; S. R. Russell, E. I. du Pont de Nemours and Co., Inc., Wilmington, Del.; E. C. Brown, Good Roads Machinery Co., Kennett Square, Penn. M. S. Lambert, of the Robins Conveying Belt Co., Chicago, Ill., was elected representative of the Manufacturers' Division on the board of directors of the National Crushed Stone Association, in addition to the chairman and retiring chairman.

H. M. Davison, retiring chairman of Manufacturers' Division

U. S. Gypsum to Expand Midland, Calif., Plant

ACCORDING to representatives of the United States Gypsum Co., the company will build a gypsum wallboard plant at Midland, Calif., during the spring of 1931. The company now has an investment of more than $500,000 at Midland, which includes a mine, mining machinery, power plant, reduction mill, fertilizer plant and many homes for workmen.

At the present there are 50 men employed and with the revival of building at least that many more will be employed.—*Riverside* (Calif.) *Press.*

Large Cement Awards Pending in Cook County, Ill., District

CEMENT PRODUCERS in the Chicago district were confident that buying for the 1931 highway programs and public works projects will soon be active throughout this entire selling territory. Cook county is expected to award contracts soon for 750,000 bbl. for which bids have been received.

The state of Missouri has received bids on 1,600,000 bbl., but no action has been taken as yet as regards the awards. The reports here indicate that Iowa is planning an extensive hard road program. It is expected that the states of Wisconsin and Michigan soon will be receiving bids. In Michigan the state buys some cement and the contractors also buy a part of the material required.—*Chicago* (Ill.) *Journal of Commerce.*

New Concrete Pipe Plant for King City, Calif.

PRODUCTION started January 1 at the Fowler and Myers Co.'s concrete pipe plant. Pipe was turned out just 4½ weeks after the announcement of the company's entrance into King City, according to J. R. Clark, resident manager.

Seven buildings have been erected on the company's property. The structures include two dwellings to be used as employes' quarters, tool house, cement storage house, pipe machinery building, office and garage.

The Fowler and Myers Co. also operate plants at Somis and San Fernando, Calif.—*King City* (Calif.) *Rustler.*

Ready-Mixed Concrete Producer to Erect New Plant

WHAT IS SAID will be the largest plant of its kind in Ohio will be erected at Eighth and Garrard streets, Cincinnati, Ohio, by Avril Tru-Batch Concrete, Inc., for the manufacture of ready-mixed concrete, according to an application for a permit, made recently. The estimated cost is $20,000. The company also has a plant at Winton place. —*Cincinnati* (Ohio) *Times-Star.*

Manufacturers' Exhibits at N. C. S. A. Meet

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—At the plant of the General Materials Co., this exhibitor displayed a 5-in. Newhouse crusher, 24 in. x8 in. fine jaw crusher, 4x8 ft. triple deck and 3x6 ft. double deck vibrating screens. All interested stone producers were taken from the hotel to the plant. In the booth photographs of a Style B Newhouse crusher and catalogs were exhibited. Represented by J. C. Collier, I. K. Cox, A. Goldberg, C. S. Lincoln, R. M. Schade, H. W. Schaub, G. W. Shores and W. F. Taylor.

American Manganese Steel Co., Chicago Heights, Ill.—Displayed a manganese steel-pan conveyor, bucket, dipper teeth, hammers, Amsco 459 hard surfacing welding rod and manganese welding rod. Represented by J. O. F. Clark, A. W. Daniels and W. J. Mullaly.

Earle C. Bacon, Inc., New York, N. Y.—Displayed model of Farrel-Bacon jaw crusher also a large panel illustration of their 42x36 in. jaw crusher. A Farrel-Sykes speed reducer was also shown along with catlogs. Represented by W. H. Milroy, J. W. Morrissey and W. V. Pietsch.

Bucyrus-Erie Co., South Milwaukee, Wis.—This exhibitor conducted an interesting guessing contest titled the N. C. S. A. Better Business Boosters. The object was to find and speak to "old man booster" who was attending the convention incognito. The first five members to find him were awarded prizes of $10.00 each. The winners were Geoff. Saeger, Missouri Portland Cement Co.; B. P. Rex, General Crushed Stone Co.; B. A. McKinney, West Roxbury Trap Rock Co.; Dan Sanborn, Lehigh Stone Co., and Frank Jones, General Crushed Stone Co. Photographic panels showing several models of B.-E. quarry shovels were displayed in the company's booth. Represented by J. C. Alexander, B. R. Andres, W. R. Beebe, H. H. Buchanan, R. W. Conant, J. W. Fawcett, E. G. Lewis, F. C. Ruhloff, N. J. Woodhull and F. O. Wyse.

Buffalo Wire Works, Buffalo, N. Y.—Displayed samples of steel and galvanized wire cloth of all meshes and gages. Also catalogs. Represented by W. D. O'Neil.

Burrell Engineering and Construction Co., Chicago, Ill.—Displayed literature on several crushed stone plants designed by them. Represented by M. H. Baldwin.

Chicago Pneumatic Tool Co., New York, N. Y.—Displayed several models of pneumatic rock drills and tools. Represented by C. L. Benedict, J. I. Edwards, D. G. Reeder and J. W. Zinkgraf.

Cleveland Rock Drill Co., Cleveland, Ohio—Displayed one of rock drills cut away and running at slow speed to show working principle. Also a pavement breaker, clay digger, drifter and drill steel. Also had ready for distribution their new hand book for drillers. Represented by W. L. McGonigle and E. L. Oldham.

Colprovia Roads, Inc., New York, N. Y.—Displayed samples of asphaltic concrete quarry type and Topeka mix of Colprovia a process under which all types of asphaltic pavements are produced without the use of heat in the manufacture or laying. Represented by H. L. Abbott and J. A. Dow.

Cross Engineering Co., Carbondale, Penn.—Displayed perforated screen plate samples, also plate for vibrating screens manufactured of Rol-man manganese steel and special alloys. Represented by W. S. Nicol.

Deister Concentrator Co., Ft. Wayne, Ind.—Displayed a 3x6 ft. double-deck Leahy vibrating screen, also a laboratory type 17x32 in. vibrating screen. An interesting part of the exhibit was a machine which showed in graph form the vibration motion of their screens. Represented by C. W. Fugate and J. J. Welch.

Deister Machine Co., Ft. Wayne, Ind.—Displayed a 3x8 ft. double-deck "Plato" vibrating screen. Also literature. Represented by I. F. Deister and B. J. Roberts.

E. I. du Pont de Nemours & Co., Wilmington, Del.—Displayed copies of "Explosive Service Bulletin" and "The Du Pont Magazine." Represented by H. H. Hamilton, J. W. Koster, W. W. Phillips, S. R. Russell and Edwin Wolf.

Easton Car & Construction Co., Easton, Penn.—This booth was attractively decorated by a display of an original oil painting of their quarry car and a neon electric sign. Represented by W. E. Farrell, J. C. Farrell and G. W. Fraunfelder.

Fate-Root-Heath Co., (Plymouth Locomotive Works) Plymouth, Ohio—Displayed photographs and reprints of advertisements of various types of gasoline and diesel locomotives for quarry service. Represented by J. L. Smith.

Frog, Switch & Mfg. Co., Carlisle, Penn.—Displayed line of manganese steel crusher castings, hammermill grate bars and hammers, manganese elevator chain, dipper teeth and caterpillar tread. Represented by H. A. Johann.

Gardner-Denver Co., Quincy, Ill.—Displayed several models of their rock drills, pneumatic tools, and drill steel. Also catalogs and literature. Represented by B. C. Essig.

General Electric Co., Schenectady, N. Y.—Displayed an enclosed fan cooled motor for use under dirty, dusty or moist conditions. Also a photoelectric relay set up so as to operate a movable sign by passing a card through the light beam to a photoelectric cell. Two years ago a similar photoelectric cell control was shown at the convention as a laboratory development, the device today is a commercial product and is being used for throwing switches, opening doors, gates or any place where a straight line thrust through a short distance is desired. Represented by D. L. Chesnut, K. H. Runkle and L. W. Shugg.

Good Roads Machinery Co., Kennett Square, Penn.—Displayed models No. 6 and No. 10 Champion jaw crushers. Also a working model of double-deck vibrating screen. Represented by J. M. Bishop, E. C. Brown, M. A. King, J. W. Kitts, L. C. Perry, R. S. Tucker.

Harnischfeger Corp., Milwaukee, Wis.—Displayed a working model of the P&H Model 600 electric shovel working in rock. Also several panels of photographs showing line of excavating equipment. Represented by T. A. Burns, H. M. Davison and G. L. Lillard.

Hendrick Mfg. Co., Carbondale, Penn.—Displayed perforated screen plates for vibrating screens and flat plates. Also the Weston testing screen for samples of stone and sand. Represented by D. W. Blackburn and B. G. Shotton.

Hercules Powder Co., Wilmington, Del.—An attractive display panel showing samples of dynamite and blasting accessories. Represented by W. J. Austin, J. Barab, W. F. Gainty, N. S. Greensfelder, L. Keane and J. K. Walsh.

The Hitchcock Co., Inc., Boston, Mass.—Displayed samples of conveyor belting that have been surfaced with Covulc which is a plastic rubber compound for renewing conveyor belts and for lining chutes, hoppers, etc. Represented by E. W. Fleming and W. A. Heppler.

Huron Industries, Inc., Alpena, Mich.—Displayed a 3x6 ft. double deck vibrating screen and a small working model of live roll grizzly also of their Huron seal ring. A large panel showed a cut-away view of their heavy duty screen. Represented by B. E. Green and F. H. Schwarz.

Illinois Powder Manufacturing Co., St. Louis, Mo.—An attractively decorated booth displaying literature and several souvenirs that were distributed. Represented by A. H. Bassler, H. J. Brockman, T. A. Brockman, T. G. Brockman, K. A. Browning, R. T. Collins, G. S. Earnshaw, G. Garden I. M. Griffen, Jr., A. H. Harter, J. R. Little, R. Martin, F. G. Morrison, M. G. Moses, G. Seippel, C. W. Swanson, and R. Watkins.

Ingersoll-Rand Co., New York, N. Y.—Displayed several types of jack hammer drills and pneumatic tools also drill steel. Also catalogs and literature on their equipment. Represented by Wm. Broan, J. Crocker and C. Larson.

Jaeger Machine Co., Columbus, Ohio—Displayed panels of photographs showing truck mixer and agitator bodies. Also moving pictures of their equipment in operation. Represented by H. L. Bachman and C. C. Riordan.

Kennedy-Van Saun Mfg. & Engr. Corp., New York, N. Y.—Displayed a working model of gearless gyratory crusher for fine crushing. Also literature of crushing equipment. Represented by F. O. Reedy.

Kensington Steel Co., Chicago, Ill.—Displayed manganese steel castings of breaker plates, sprockets with renewable teeth, buckets, car wheels, etc. Represented by E. C. Bauer and W. Ellis.

Keystone Lubricating Co., Philadelphia, Penn.—Display showing lubrication of bearings to show feed cup. Also cut-away hand lubricator. Catalogs of an automatic lubricating system controlled by an electric clock. Represented by R. C. Barlow, P. Cassidy, P. Reinking, J. Sloss and J. H. Yerkes.

Koppel Industrial Car & Equipment Co., Koppel, Penn.—Displayed photographs showing various types of quarry cars. Represented by H. W. Redman and W. W. Stewart.

Link-Belt Co., Chicago, Ill.—Displayed a 30 in. heavy duty manganese steel feeder, working model of vibrating screen, a Timken roller bearing belt conveyor idler, Sykes herringbone speed reducer and literature. Represented by C. S. Huntington, J. Richards and A. K. Schifflin.

Loomis Machine Co., Tiffin, Ohio—Displayed the top mast of the "Loomis Clipper" patented wire line drilling attachment for line drilling. Also catalogs on various types of blast hole drills. Represented by J. Reynard and C. A. Riggs.

Ludlow-Saylor Wire Co., St. Louis, Mo.—Displayed samples of wire cloth of all sizes. Represented by J. Ashcroft, E. G. Doernhoefer and F. B. Ungar.

Macasphalt Corp. of America, New York, N. Y.—Displayed samples of aggregate Macasphalt and photographs of roads made with product. Represented by O. H. Berger and W. R. Yoakley.

Manganese Steel Forge Co., Philadelphia, Penn.—Displayed double lock mesh screens, fine mesh screen cloth (2 to 16 mesh), rolled manganese steel plate, perforated rolled manganese steel plate for screening, bolts, pins and bushings of rolled and forged manganese steel, special rolled and forged manganese steel chain and a section of Rol-Man double-lock mesh screen which has handled more than a million tons of sand and gravel on a rotary scalper before replacement. Represented by W. H. Potter and J. H. McKinley.

Marion Steam Shovel Co., Marion, Ohio—This exhibitor conducted one of the usual interesting contests for producers. This year there were three questions to be answered namely: 1. How many teeth in the main gear of the single reduction herringbone drive on the hoisting unit on their type 4120 shovel? 2. How many pounds does the assembled lower frame of this model shovel weigh? 3. How big a rock in pounds will a type 4120 shovel lift? The correct answers to these questions are 1—*262*; 2—82,647 lb.; 3—48,325 lb. The winners, their guesses and prizes were as follows: 1st, W. D. Manchester, Lynn Sand & Stone Co., guess 226; 82,500 lb.; 48,950 lb., prize set of golf clubs and bag. 2nd, E. G. Souders, J. T. Dyer Quarry Co., guess 243; 82,250 lb.; 53,000 lb., prize set of golf clubs and bag. 3rd, H. E. Rainer, Federal Crushed Stone Co., guess 240; 80,000 lb.; 53,000 lb., prize traveling bag. 4th, F. N. Taff, North Jersey Quarry Co., guess 270; 76,000 lb.; 54,000 lb., prize hand bag. 5th, C. H. Latham, Hartford Sand & Stone Co., guess 224; 79,754 lb.; 44,790 lb., prize shirt and tie. 6th, Harry Johnston, Van Camp Stone Co., guess 203; 83,360 lb.; 52,300 lb. Prize, shirt and tie. 7th, H. M. Sharp, France Stone Co., guess 217; 92,726 lb.; 52,700 lb. Prize, shirt and tie. 8th, Hugh McNabb, Federal Crushed Stone Co., guess 250; 55,000 lb.; 48,000 lb. Prize, shirt and tie. In the booth several photographs of Marion quarry shovels were displayed. Represented by J. P. Courtright, J. B. Crew, G. W. Davisson, H. T. Gracely, G. B. Heffelfinger, W. N. Westland and E. R. Wilson.

McLanahan and Stone Corp., Hollidaysburg, Penn.—Displayed a working model of double steel log washer, also a working model of their single roll crusher (steel constructed). Catalogs and photographs of their equipment for the crushed stone industry were displayed. Represented by J. C. McLanahan and E. B. Taggart.

Midwest Locomotive Works, Hamilton, Ohio—Displayed photographs and literature of line of gasoline, Diesel, gas-electric and Diesel-electric locomotives for quarry haulage. Represented by A. E. Aimlay.

National Crushed Stone Association, Washington, D. C.—Displayed illuminated photographic panels showing various views of the association's research laboratory, also of various uses of crushed stone in road construction work. An interesting part of the exhibit were specimens and the results of soundness and abrasion tests made in the laboratory. Represented by J. R. Boyd, A. T. Goldbeck and J. E. Gray.

National Equipment Corp., Milwaukee, Wis.—Displayed photographs and literature of line of excavating equipment and pumps. Represented by C. F. Rabbett.

National Safety Council, Chicago, Ill.—Displayed bulletins and pamphlets showing the working they are doing to promote safety in the industry. Represented by J. V. Scott.

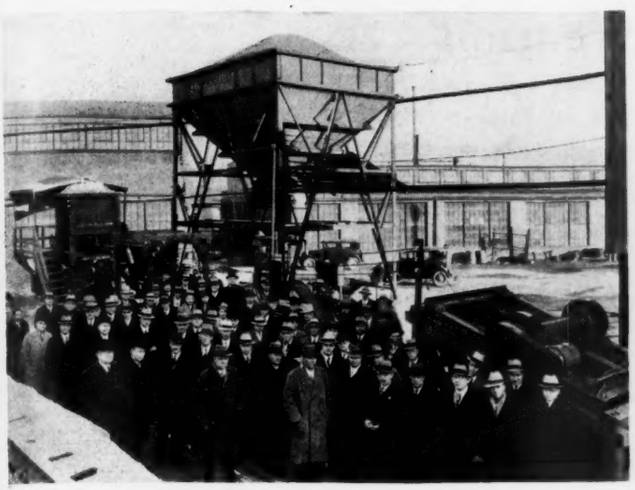
New York Cordage Co., New York, N. Y.—Displayed Nycord drilling cable and Nycord rainbow wire rope. Represented by J. A. Allen.

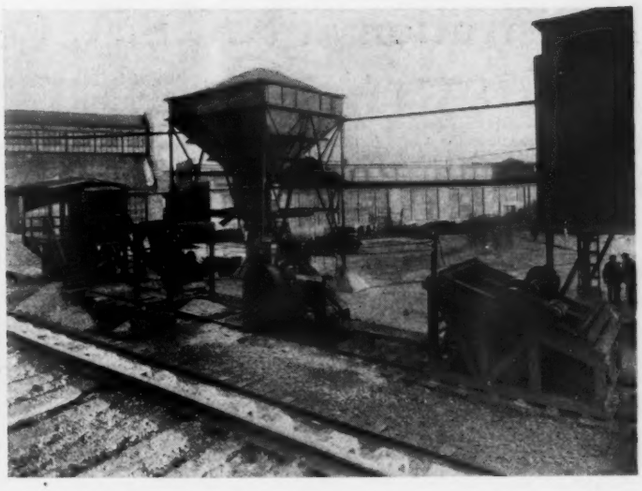
Niagara Concrete Mixer Co., Buffalo, N. Y.—Displayed a 4x8 ft. double deck vibrating screen. Also literature of their line of vibrating screens. Represented by H. C. Avery, J. W. Ingersoll and A. E. Owen.

Nordberg Mfg. Co., Milwaukee, Wis.—Displayed a working model, which showed the construction and operation, of the Symons Cone crusher. Also exhibited Symons rocker screen. Represented by A. C. Colby, C. H. Gaut, L. D. Hudson and L. D. Hudson, Jr.

Northwest Engineering Co., Chicago, Ill.—Displayed a dragline bucket and photographs and literature on their line of excavating equipment. Represented by H. A. Hutchins.

Ohio Power Shovel Co., Lima, Ohio—An illuminated quarry scene showing a Lima 101 shovel loading stone across the back of this booth made an attractive display. Literature on line of power shovels for quarry work were displayed. Represented by H. Barnhart, M. K. Tate and R. K. Wills.





Some of the equipment was shown at the plant of the General Materials Co.

Pit & Quarry, Chicago, Ill.—Displayed copies of the current issue of their publication. Represented by M. F. Beisber, W. A. Buschman, A. J. Hoskins, S. A. Phillips and L. C. Thaon.

Productive Equipment Corp., Chicago, Ill.—Displayed a 3x8 ft. double deck, open-type "jigger" vibrating screen. Also a 1x3 ft. single deck semi-enclosed screen. Represented by A. T. Ward and J. L. Westenhauer.

Robins Conveying Belt Co., New York, N. Y.—Displayed a working model of the Adams avalanche, withdrawal and floating chutes designed to prevent breakage and segregation. At 1431 Locust St., displayed a full sized 1931 model 5x10 ft. double-deck Gyrex screen in operation. Also newly developed conveyor and idler rolls. Among the latter was the "Belt-trainer" a return idler for keeping the belt running straight. Other standard types of Robins idlers were also displayed. Represented by M. S. Lambert, M. E. Robins and S. D. Robins.

Rock Products, Chicago, Ill.—Displayed copies of the current Annual Review Number. Represented by E. C. Harsh, N. C. Rockwood and R. C. Sullivan.

Ross Screen and Feeder Co., New York, N. Y.—Exhibited a working model of the Ross chain feeder, screen feeder and grizzley feeder. Also photographs of installations of feeder in the crushed stone industry. Represented by E. Webster.

Sanderson-Cyclone Drill Co., Orrville, Ohio—Displayed catalogs and literature on the line of well drills. Represented by W. F. Nothacker.

Sauerman Bros., Inc., Chicago, Ill.—Displayed working models of a Sauerman slackline cableway and dragline system. Represented by R. H. Baughman.

Simplicity Engineering Co., Durand, Mich.—Displayed a 3x6 ft. double-deck scalping type vibrating screen. Also photographs of their dewatering wheel. Represented by F. D. Barber, G. W. Behnke, F. Buell, R. C. Dunckel, J. B. Gower, C. W. Harder and E. H. Martin.

Stearns Conveyor Co., Cleveland, Ohio—Displayed four Rex leak proof apron conveyors with equalizing saddles and outboard renewable bushings and rollers. Also exhibited several types of their conveyor idlers and samples of buckets and chain. Represented by G. M. Dyke and W. B. Marshall.

Stephens-Adamson Mfg. Co., Aurora, Ill.—An attractive illuminated display showing S-A installations of their equipment for conveying, storing, reclaiming and material handling was a prominent part of this exhibit. Also showed an idler and valuable speed reducer. Represented by C. H. Adamson, E. J. Patton, T. A. Ruddy and F. S. Wells.

Sullivan Machinery Co., Chicago, Ill.—Exhibited a model T-5 4-in. drifter, models L-6 and T-7 hammer drills also drill steel and literature. Represented by J. F. Berteling.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J.—Displayed stainless steel castings and manganese steel castings of crusher parts, elevator buckets, jaw plates, wearing parts. Also Timang (air-toughening) steel welding rod. Represented by C. B. Andrews, L. E. MacFayden, J. R. Smith and J. C. Taylor, Jr.

Thew Shovel Co., Lorain, Ohio—Displayed large photographs of the Lorain 75 shovel operating in quarries. Represented by M. B. Garber.

Traylor Engineering & Mfg. Co., Allentown, Penn.—Displayed catalogs and bulletins covering line of crushing and screening equipment. Represented by O. E. Thaleg.

Troco Lubricating Co., Philadelphia, Penn.—Exhibited a central pressure lubricating system using Troco grease which can be used to lubricate 1 to 1000 bearings. Represented by L. Beebe and R. MacIntosh.

W. S. Tyler Co., Cleveland, Ohio—Displayed Ro-Tap testing sieve shaker and a set of Tyler standard screen scale testing sieves. Also various size samples of wire cloth and Ton-cap screens. Photographs of Hum-mer vibrating screens were also displayed. Represented by A. D. Busch, W. W. King and W. J. Piggott.

U. S. Bureau of Mines, Washington, D. C.—Displayed animated figures representing a workman giving artificial respiration to another showing remedy for electric shock, drowning or asphyxiation. Also various bulletins on mining and crushing costs and methods, crushed stone production graphs, accident rates, etc. Represented by W. W. Adams, A. A. Munsch and J. R. Thoenen.

U. S. Bureau of Public Roads, Washington, D. C.—An interesting display showing a cross section of a crushed stone road. Also a similar one of a concrete road.

Vulcan Iron Works, Wilkes-Barre, Penn.—Displayed photographs and broadsides of line of steam, gas, Diesel, Diesel-electric, gas-electric, trolley and storage battery locomotives. Represented by T. MacLachlan and J. F. O'Brien.

F. M. Welch Engineering Service., Inc., Greenville, Ohio—Displayed photographs of the Greenville stacker and a model of the Allswede scrubber. Represented by G. D. Hawley and F. M. Welch.

West Process Pavement Co., Louisville, Ky.—Displayed samples of Westphalt hot-lay and R-T and cold-lay. Also pictures showing applications of their product. Represented by A. E. Ryan and W. C. West.

Woodford Engineering Co., Chicago, Ill.—Exhibited a full sized standard apparatus consisting of a controller from main control tower, standard car equipment from the electrically controlled quarry cars. Also pictures of Woodford haulage system installation. Represented by L. M. Harper and F. E. Woodford.

Associate Members Other Than Exhibitors Who Registered

American Car and Foundry Co.—A. M. Farrier, J. B. Herman, R. A. Williams.

American Steel and Wire Co.—R. S. Green.

American Tar Products Co.—H. H. Smith.

Armstrong Manufacturing Co.—F. J. Schermer.

Atlas Powder Co.—W. L. Beers, L. Clayton, W. C. Davis, P. T. Evans, A. D. Hammond.

Barrett Co.—G. E. Martin.

Blaw-Knox Co.—G. Schirmer.

Burton Explosives Co.—A. G. Bartlett, J. S. Burton, W. O. Dunn, R. F. Kelley, M. S. Kincaid.

Ensign-Bickford Co.—S. S. Ellsworth.

Keith-Dunham Co.—C. H. Doty, J. P. Thomas.

Mack-International Truck Corp.—R. A. Bishop.

Peerless Union Explosives Corp.—H. H. Conley, W. L. Shedd.

Schram, Inc.—A. O. Witt.

Westinghouse Electric and Manufacturing Co.—J. E. Borland.

American Aggregates Sells Part of Its Holdings

A DEAL OF considerable magnitude, representing the sale of properties valued at between two and three million dollars was consummated and ratified by the officers and stockholders of American Aggregates Corp., Greenville, Ohio.

The deal involved all the gravel properties acquired by the American Aggregates Corp. during the past several years in Cincinnati and immediate vicinity. It included properties acquired of the Ohio Ballast Gravel Co., the T. J. Hall Co., the Acme Sand and Gravel Co. and several lesser properties.

The purchasers were former stockholders in the various Cincinnati companies which American Aggregates Corp. purchased as above mentioned. These Cincinnati stockholders have formed a coalition and will form a new company to operate all of the properties of the various former Cincinnati companies as one company.

It is understood that the consideration paid to the American Aggregates Corp. was between two and three million dollars.

The sale of the Cincinnati properties enables the officers of American Aggregates Corp. to give their undivided attention to the development and operation of their remaining properties in Ohio, Indiana and Michigan and to take advantage of any opportunities for desirable expansion should such occasion arise.—*Dayton* (Ohio) *News.*

Reagan Houston Is Made President of Cement Company

AT A called meeting of the board of directors of the Republic Portland Cement Co. of San Antonio, Texas, Reagan Houston of San Antonio was elected president and a director. Mr. Houston succeeds the late J. H. Smith.—*Dallas* (Tex.) *News.*

Registration at N.C.S.A. Convention

Producers

Acme Limestone Co.—A. W. McThenia, H. M. Rigg, J. A. Rigg, Alderson, W. Va.
American Limestone Co.—W. W. Curnutt, R. P. Immel, Thomas McCroskey, Knoxville, Tenn.
C. C. Beam, Inc.—C. C. Beam, Melvin, Ohio.
Big Bend Quarry Co.—W. R. Fisher, Maplewood, Mo.; W. J. Doran, Louis Skrainka, W. J. Skrainka, St. Louis, Mo.
Blue Ridge Stone Corp.—L. J. Boxley, Roanoke, Va.
Buffalo Crushed Stone Co.—A. J. Hooker, James Savage, Buffalo, N. Y.
Builders Material Co.—Lee Crawford, Cedar Rapids, Iowa; K. C. Gravenhorst, La Porte City, Iowa.
Callanan Road Improvement Co.—B. R. Babcock, South Bethlehem, N. Y.; H. E. Battin, Jr., Albany, N. Y.
Canada Crushed Stone Corp., Ltd.—R. W. Cunningham, C. M. Doolittle, D. Roy Watson, Hamilton, Ont.
Carbon Limestone Co.—Fred O. Earnshaw, Joseph H. Jackson, Youngstown, Ohio; R. C. Shepherd, Hillsville, Penn.
Cedar Bluff Quarry—John F. Robertson, W. C. Sparks, Princeton, Ky.
Columbia Quarry Co.—R. D. Abrell, W. T. Kieffer, Dr. C. H. Krause, E. J. Krause, H. C. Krause, Harry F. Schmitt, H. G. Wilson, St. Louis, Mo.; Thomas Murphy, Bonne Terre, Mo.; C. E. Klaus, H. A. Heise, C. E. Glassen, Columbia, Ill.; C. E. Ward, Murphysboro, Ill.
Connecticut Quarries Co., Inc.—F. H. Edwards, Elwood T. Nettleton, Robert Rose, A. L. Worthen, New Haven, Conn.; R. D. Brewer, Plainville, Conn.; W. F. Quinn, Rocky Hill, Conn.; Frank B. Kimball, Wallingford, Conn.
Consolidated Quarries Co.—Nelson Severinghaus, Lithonia, Ga.
Consolidated Stone and Sand Co.—George J. Fredericks, Montclair Heights, N. J.
Cushing Stone Co.—William J. Adams, J. C. Cushing, J. E. Cushing, Schenectady, N. Y.
Dittlinger Lime Co.—I. A. Ogden, New Braunfels, Tex.
Dolese and Shepard Co.—O. P. Chamberlain, Chicago, Ill.
Dolomite Products Co., Inc.—Harvey N. Clark, John Odenbach, Rochester, N. Y.
Dubuque Stone Products Co.—Herbert E. Manahl, Dubuque, Iowa.
Duluth Crushed Stone Co.—J. R. Beerhalter, C. D. Brewer, Duluth, Minn.
John T. Dyer Quarry Co.—G. F. Arters, Lewis Holstein, David Johnson, E. Keim, William Mohr, Maurice Murray, Henry A. Rowan, Harry Schwartz, Birdsboro, Penn.; F. T. Gucker, E. G. Souders, Norristown, Penn.
Eastern Rock Products, Inc.—Earl Elmer, Latham B. Gray, Utica, N. Y.
Elmhurst-Chicago Stone Co.—M. M. Bales, Martin Hammerschmidt, Elmhurst, Ill.
A. H. Eyermann Contracting Co.—William J. Eyermann, A. H. Schmalz, St. Louis, Mo.
Federal Crushed Stone Corp.—Hugh M. McNabb, H. E. Rainer, Buffalo, N. Y.
France Stone Co.—C. G. Adams, H. E. Bair, Herbert F. Kriege, H. M. Sharp, Toledo, Ohio.
Franklin Limestone Co.—A. B. Rodes, H. E. Rodes, Nashville, Tenn.
General Crushed Stone Co.—J. D. Hawthorne, Akron, N. Y.; W. J. Weiman, Auburn, N. Y.; Scott Coulter, Cazenovia, N. Y.; Otho M. Graves, A. L. Herster, Frank S. Jones, C. H. Matchett, Redington Moore, B. P. Rex, John Rice, John Rice, Jr., H. F. Yotter, Easton, Penn.; E. W. Faylor, Glen Mills, Penn.; W. I. Hinds, Laconda, N. Y.; A. L. Scott, Le Roy, N. Y.; Grover J. Murphy, Little Falls, N. Y.; E. E. Dotter, Quakertown, Penn.; L. M. Croll, Phelps, N. Y.; H. B. Allen, Philadelphia, Penn.; G. D. Faylor, Port Deposit, Md.; George E. Schaefer, Rochester, N. Y.; Meredith Bovee, D. C. Hickey, F. F. McLaughlin, F. C. Owens, A. G. Seitz, W. L. Snorborg, Syracuse, N. Y.; H. L. Cox, Lewis H. Putnam, Watertown, N. Y.; P. H. Jacoby, White Haven, Penn.; T. A. Lanagan, M. V. McKeon, Winchester, Mass.
Genesee Stone Products Corp.—F. T. Bibb, C. L. Buchholtz, Batavia, N. Y.
Granite Rock Co.—A. J. Wilson, Watsonville, Calif.
Greenfield, Mass. Broken Stone Co.—Lawrence Robinson, Greenfield, Mass.
Hartford Sand and Stone Co.—Harold C. Latham, Hartford, Conn.
Hollister Trap Rock Co.—F. C. Norton, Boston, Mass.
Holston Quarry Co.—R. S. Campbell, Thomas McCloskey, Jr., Knoxville, Tenn.
T. C. Hulbert and Co., Inc.—Robert Lacy, Wilmington, Del.
Illinois Electric Limestone Co.—Allen C. Dodd, Ralph Jacoby, John D. Moore, Charles P. Tigges, St. Louis, Mo.
Kentucky-Virginia Stone Co.—W. B. Paynter, Middlesboro, Ky.
Lake Erie Limestone Co.—William M. Andrews, Youngstown, Ohio.
Lambertville Trap Rock Co.—L. W. Kirkpatrick, Lambertville, N. J.
John S. Lane and Son, Inc., Meriden, Conn.—Arthur S. Lane, Ralph M. Robinson, Meriden, Conn.
Lehigh Stone Co.—Dan Sanborn, W. R. Sanborn, Kankakee, Ill.
Le Roy Lime and Crushed Stone Corp.—W. R. Heimlich, Frank M. Howe, Le Roy, N. Y.
Liberty Limestone Corp.—J. W. Stull, Rocky Point, Va.
Linwood Cement Co.—John F. Schroeder, Davenport, Iowa.
Louisville Cement Corp.—J. M. Buckhert, Louisville, Ky.
Lynn Sand and Stone Co.—Ted C. Cooke, W. D. Manchester, Swampscott, Mass.
Marble Cliff Quarries Co.—E. H. Humbertson, E. J. Kaufman, W. H. Margraf, Russell Rarey, H. R. Welch, Columbus, Ohio.
Marquette Cement Manufacturing Co.—E. M. Gould, M. P. Greer, Cape Girardeau, Mo.; Charles H. Spurr, Oglesby, Ill.; R. W. Meyer, St. Louis, Mo.
Midwest Rock Products Corp.—L. R. Cartwright, Indianapolis, Ind.
Mississippi Lime and Material Co.—Clyde C. Schmoeller, Alton, Ill.
Moulding-Brownell Corp.—A. H. Bannister, William E. Hewitt, A. L. Moscrip, Chicago, Ill.
National Crushed Stone Association—J. R. Boyd, A. T. Goldbeck, Joseph E. Gray, Washington, D. C.
National Lime and Stone Co.—R. P. Esser, C. Knoblauch, F. R. Patterson, Findlay, Ohio.
National Stone Co.—W. N. Carter, Robert J. Hummel, Joliet, Ill.
New Braunfels Limestone Co.—Max A. Altgeld, New Braunfels, Tex.
New Castle Lime and Stone Co.—Ellwood Gilbert, New Castle, Penn.
New Haven Trap Rock Co.—Albert D. Blakeslee, William E. Hilliard, Alex McKernan, Clarence A. Munson, New Haven, Conn.; Edward T. Perry, Providence, R. I.
New York Trap Rock Corp.—L. F. Miller, G. M. Tomkins, Haverstraw, N. Y.; Edward L. Heidenreich, Jr., Newburgh, N. Y.; Thomas J. Kelleher, Verplanck, N. Y.
North Jersey Quarry Co.—F. W. Schmidt, Frederick N. Taff, Irving W. Wortman, Morristown, N. J.
Ohio Crushed Stone Association—Claude L. Clark, Columbus, Ohio.
Ohio Marble Co.—A. Acton Hall, Piqua, Ohio.
Old Colony Crushed Stone Co.—W. H. Hall, Hartford, Conn.; E. R. Atwood, Quincy, Mass.
Orange Quarry Co.—John J. Crawley, Montclair, N. J.; Samuel F. Dixon, West Orange, N. J.
Pembroke Limestone Corp.—A. W. Lumsden, Pembroke, Va.
Pennsylvania Lime, Stone and Cement Co.—John A. Hipple, Rheems, Penn.
Pilot Knob Ore Co.—James C. Travilla, St. Louis, Mo.
Pounding Mill Quarry—M. H. Christian, R. A. Craig, C. M. Hunter, Jr., Pounding Mill, Va.
Reinhold and Co., Inc.—P. B. Reinhold, Pittsburgh, Penn.
Rock Hill Quarries Co.—R. Hencke, J. W. McCullough, St. Louis, Mo.
St. Louis Quarrymen's Association—E. J McMahon, St. Louis, Mo.
Southwest Stone Co.—W. F. Wise, Dallas, Tex.
Stewart Sand and Material Co.—B. B. Branstetter, Columbia, Mo.; W. B. Carswell, H. T. Jackson, P. J. Mack, John Prince, Ray Williams, Kansas City, Mo.
Casper Stolle Quarry and Contracting Co.—J. P. Rayoun, Carl A. Stolle, F. W. Stolle, East St. Louis, Ill.
Sunbeam Quarries Co.—James B. Beam, Bardstown, Ky.; T. J. Beam, Clermont, Ky.; F. H. Lanham, Louisville, Ky.
Texas Crushed Stone, Sand and Gravel Association—W. W. Carson, Jr., Austin, Tex.
Tower Grove Quarry and Construction Co.—F. C. Webb, St. Louis, Mo.
Trumbower Co.—Frank F. Keim, William J. Santee, Nazareth, Penn.
Union Limestone Co.—W. W. Duff, New Castle, Penn.
Union Quarry Co.—Louis A. Schollmeyer, Harry F. Steininger, St. Louis, Mo.
Van Camp Stone Co.—H. A. Johnston, Lebanon, Ohio.
West Roxbury Trap Rock Co.—Frank J. Long, B. A. McKinney, West Roxbury, Mass.
Weston and Brooker Co.—T. R. Jamison, Camak, Ga.; T. I. Weston, Columbia, S. C.; R. A. Hemphill, Trenton, S. C.
Wickwire Spencer Steel Co.—W. E. Foote, Gasport, N. Y.
York Valley Lime and Stone Co.—F. W. Cramer, York, Penn.
Zenith Limestone Co.—J. B. La Barge, Tulsa, Okla.

Guests

F. B. Acosta, St. Louis, Mo.
Alemite Co.—L. H. Seitz, St. Louis, Mo.
American Bitumuls Co.—C. L. McKesson, San Francisco, Calif.
American Pulverizer Co.—E. E. Ezlemeyer, St. Louis, Mo.
Asphalt Institute—E. Bernard Gray, New York.
Auxvasse Quarry Co.—S. T. Harrison, Auxvasse, Mo.
O. B. Avery Co.—J. B. Juett, St. Louis, Mo.
Bay City Truck Crane Co.—F. W. Truex, Bay City, Mich.
Blanton Stone Co.—James R. Thompson, Frankfort, Ky.
Boston Trap Rock Co.—John F. Gilmore, Boston.
Edwin Brooker, commerce counsel, Washington.
Prof. A. C. Busse, N. Y. University, New York.
Bussen Quarries, Inc.—Albert J. Bussen, Sylvester L. Bussen, Jefferson Barracks, Mo.
C. J. Cange, East St. Louis, Ill.
Carbonite Metal, Ltd.—L. D. Staplin, L. E. Staplin, Chicago, Ill.
Clinton Motors Corp.—G. M. Bunn, Reading, Penn.
Columbia Products Co.—W. W. Bolton, Barberton, Ohio.
Connecticut State Highway Department—Robert Stevens, Hartford, Conn.
W. N. Damm Quarries—W. N. Damm, Neelys Landing, Mo.
F. W. Dodge Corp.—T. S. Holden, New York.
Dolomite, Inc.—W. H. Cameron, Cleveland, Ohio; C. V. Gallagher, Maple Grove, Ohio.
Douds Stone Co.—Harold Linge, H. E. Millen, Douds, Ia.
Doyle Construction Co.—John Doyle, Atherton, Australia.
East St. Louis Stone Co.—M. E. McLean, East St. Louis, Ill.
Fairbanks, Morse and Co.—Theodore M. Robie, Chicago, Ill.
J. W. Fallon, 1465 Goodfellow Blvd., St. Louis.
Fehlig Construction Co.—J. Frank Fehlig, St. Louis, Mo.
General Material Co.—A. C. Butterworth, H. F. Thomson, St. Louis, Mo.
Wm. P. Gruendler Crusher and Pulverizer Co.—Wm. P. Gruendler, St. Louis, Mo.
William B. Guitteau, collector of internal revenue, Toledo, Ohio.
Hawley, Freese and Nichols—F. W. Freese, Fort Worth, Tex.
Illinois Agricultural Assn.—J. R. Bent, Chicago.
International Harvester Co.—M. F. McCarty, St. Louis, Mo.
Iowa Limestone Co.—J. A. Owens, Alden, Ia.
Jeffrey Manufacturing Co.—J. R. Bakstad, R. D. Nichols, Columbus, Ohio.
Jointa Lime Co.—H. J. Russell, Glens Falls, N. Y.
Robert Kratky, St. Louis, Mo.
H. N. Lendall, Rutgers University, New Brunswick, N. J.
A. Leschen and Sons Rope Co.—A. H. Depelheuer, St. Louis, Mo.
Lima Stone Co.—Charles Killen, Lima, Ohio.
Malden Crushed Stone Co.—M. McDonough, Malden, Mass.
McLean Stone Co.—M. E. McLean, Nashville.
Michigan Limestone and Chemical Co.—N. G. Farber, Buffalo, N. Y.
Missouri State Highway Department—M. S. Lattimore, Macon, Mo.; W. E. Pugsley, S. M. Rudder, Webster Groves, Mo.
National Safety Council—Jack V. Scott, Chicago.
National Sand and Gravel Association—V. P. Ahearn, Stanton Walker, Washington, D. C.; D. D. McGuire, St. Louis, Mo.
New York Central R.R.—J. V. Neubert, New York.
New York Rubber Corp.—E. P. Rowen, Chicago, Ill.; O. D. Upton, Dallas, Tex.
Prof. E. E. Nyberg, N. Y. University, New York.
Pennsylvania Department of Labor—Thomas J. Quigley, Bloomsburg, Penn.
Petroleum Iron Works Co.—H. J. Cullinan, Houston, Tex.
Portland Cement Association—H. F. Gonnerman, Chicago, Ill.; R. F. Dierking, St. Louis, Mo.
Reliance Whiting Co.—C. E. Hermann, Alton, Ill.
Ryan Quarries, Inc.—J. H. Ryan, Albion, Ky.
St. Louis Material and Supply Co.—N. J. Eschenberg, St. Louis, Mo.
St. Louis City Hall—Charles W. Barnes, Jr.; J. B. Clayton, Jr.; George C. Gundlach, Vincent Schroder, Harold T. Smutz, Mark R. Thompson, Fred Wolffe.
Timken Roller Bearing Co.—V. Steele, St. Louis.
United States Bureau of Mines—W. W. Adams, J. R. Thoenen, Washington, D. C.; Albert A. Munsch, Pittsburgh, Penn.
Van Orman's Quarry—Fred Fiala, Jr., C. E. Van Orman, Hartshorn, Okla.
Washington University—Seneca T. Ferry, Carolyn Garrel, Roy E. Huegerich, S. W. Jens, John Johnson, Charles T. Playford, George H. Stinson, Richard Torrance, W. H. Wheeler, Robert B. Wrey, St. Louis, Mo.
Webb City Foundry Co.—E. A. Henry, Webb City, Mo.
Westinghouse Electric and Manufacturing Co.—H. F. Hedderich, St. Louis, Mo.
Harold Williams, Boston, Mass.
Wm. A. Zelnicker Supply Co.—Spencer S. Swasey, Walter A. Zelnicker, St. Louis, Mo.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	1-14-31	93	.....	
Alpha P. C. new com.[2]	1-24-31	15½	16½	50c qu. Jan. 24
Alpha P. C. pfd.[2]	1-24-31	117	.....	1.75 qu. Dec. 15
American Aggregates com.	1-27-31	11	15	75c qu. Mar. 1
Am. Aggr. 6's, bonds	1-27-31	73⅛	78	
American Brick Co., sand-lime brick	10- 6-30	4½	.....	25c qu. Feb. 1, '30
American Brick Co. pfd.	1-12-31	50	57	50c qu. May 1, '30
Am. L. & S. 1st 7's[29]	1-14-31	97	99	
American Silica Corp. 6½'s[49]	1-27-31	No market		
Arundel Corp. new com.	1-28-31	41¼	42	75c qu. Jan. 2
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)*	1-27-31	No market		
Beaver P. C. 1st 7's[20]	1-23-31	93	95	
Bessemer L. & C. Class A[4]	1-24-31	29¼	32	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	1-24-31	90	94	
Bloomington Limestone 6's[29]	1-14-31	50	55	
Boston S. & G. new com.[47]	1-24-31	14	17½	40c qu. Jan. 2
Boston S. & G. new 7% pfd.[47]	1-24-31	43½	47½	87½c qu. Jan. 2
California Art Tile A	1-24-31	2	5½	43¾c qu. Mar. 31
California Art Tile B[50]	1- 8-31	.....	3	20c qu. Mar. 31
Calaveras Cement com.	1-23-31	.....	12	
Calaveras Cement 7% pfd.	1-23-31	.....	80	1.75 qu. Jan. 15
Canada Cement com.	1-26-31	12½	12⅞	
Canada Cement pfd.	1-26-31	91¾	92¾	1.62½c qu. Dec. 31
Canada Cement 5½'s[43]	1-24-31	99¼	100	
Canada Cr. St. Corp. bonds[45]	1-24-31	92½	98	
Certainteed Prod. com.	1-26-31	3¼	3½	
Certainteed Prod. pfd.	1-26-31	13	16	1.75 qu. Jan. 1
Cleveland Quarries	1-27-31	59½	65	75c qu. 25c ex. Dec. 1
Columbia S. & G. pfd.	1-26-31	80	90	
Consol. Cement 1st 6½'s, A	1-13-31	30	40	
Consol. Cement. 6½% notes	1-27-31	25	30	
Consol. Cement pfd.[29]	1-14-31	30	50	
Consol. Oka S. & G. 6½'s[42] (Canada)	1-24-31	99	102	
Consol. Rock Prod. com.[9]	1-23-31	75c	1	
Consol. Rock Prod. pfd.[9]	1-23-31	3½	4	43¾c qu. June 1, '31
Consol. Rock Prod. units	1-26-31	7	10	
Consol. S. & G. pfd. (Can.)[48]	1-24-31	78½	79¾	1.75 qu. Nov. 15
Construction Mat. com.	1-26-31	8	9½	
Construction Mat. pfd.	1-26-31	30	32	87½cqu. Feb. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	1-24-31	.....	93	
Coosa P. C. 1st 6's[29]	1-14-31	45	50	
Coplay Cem. Mfg. 1st 6's[40]	1-24-31	95	.....	
Coplay Cem. Mfg. com.[40]	1-24-31	10	.....	
Coplay Cem. Mfg. pfd.[40]	1-24-31	60	.....	
Dewey P. C. 6's (1930)[30]	1-27-31	99	101	
Dewey P. C. 6's (1931-37)[30]	1-27-31	99	101	
Dolese & Shepard	1-26-31	60	65	$2 qu. Jan. 2
Dufferin Pav. & Cr. Stone com.	1-26-31	7½	13	
Dufferin Pav. & Cr. Stone pfd.	1-26-31	75	80	1.75 qu. Jan. 2
Edison P. C. com.[39]	1-22-31	50c	.....	
Edison P. C. pfd.[39]	1-22-31	2	.....	
Giant P. C. com.[2]	1-24-31	3	10	
Giant P. C. pfd.[2]	1-24-31	25	.....	1.75 s.-a. Dec. 15
Gyp. Lime & Alabastine, Ltd.	1-26-31	12	12⅛	20c qu. Jan. 2
Gyp. Lime & Alab., Ltd., pfd.	11-17-30	.....	15	
Hermitage Cement com.[11]	1-24-31	25	30	
Hermitage Cement pfd.[11]	1-24-31	78	85	
Ideal Cement, new com.	1-26-31	47	49	75c qu. Jan. 1 & 50c ex. Dec. 22
Ideal Cement 5's, 1943[33]	1-24-31	99½	100½	
Indiana Limestone units[29]	1-14-31	80	85	
Indiana Limestone 6's	1-26-31	50	.....	
International Cem. com.	1-26-31	55	55½	$1 qu. Dec. 31
International Cem. bonds 5's	1-26-31	96	97	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	11- 1-30	90	93	
Kelley Is. L. & T. new stock	1-27-31	34½	35	62½c qu. Jan. 2
Ky. Cons. St. com. V.T. C.[48]	1-22-31	5	8	
Ky. Cons. Stone 6½'s[48]	1-22-31	85	90	
Ky. Cons. Stone com.[48]	1-22-31	5	8	
Ky. Cons. Stone pfd.[48]	1-22-31	75	80	$1.75 qu. Feb. 1
Ky. Rock Asphalt com.[11]	1-24-31	6	8	40c qu. Oct. 1, '30
Ky. Rock Asphalt pfd.[11]	1-24-31	78	80	1.75 qu. Dec. 1
Ky. Rock Asphalt 6½'s[11]	1-24-31	85	90	
Lawrence P. C.[2]	1-24-31	51	56	$1 qu. Dec. 29
Lawrence P. C. 5½'s, 1942[2]	1-24-31	87	.....	
Lehigh P. C.	1-26-31	17½	20	25c qu. Feb. 2
Lehigh P. C. pfd.	1-26-31	99¼	100	1¾% qu. Jan. 2
Louisville Cement[7]	1-22-31	150	.....	
Lyman-Richey 1st 6's, 1932[18]	1-24-31	97½	99½	
Lyman-Richey 1st 6's, 1935[18]	1-24-31	97	99	
Marblehead Lime 6's[14]	1-23-31	No market		
Marbelite Corp. com. (cement products)	11-29-30	.....	3	
Marbelite Corp. pfd.	1- 8-31	5	.....	50c qu. Oct. 10, '30
Material Service Corp.	1-26-31	18	20	50c qu. Dec. 1
McCrady-Rogers 7% pfd.[22]	1-22-31	45	50	87½ qu. Dec. 31
McCrady-Rogers com.[22]	1-22-31	15	20	
Medusa Portland Cement	1-27-31	65	70	1.50 Jan. 1
Mich. L. & C. com.[6]	12-27-30	40	.....	
Missouri P. C.	1-26-31	25½	26	50c qu. Jan. 31
Monolith Portland Midwest[9]	1-23-31	1¾	2½	
Monolith P. C. com.[9]	1-23-31	3	4	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	1-23-31	4	5	40c s.-a. Jan. 1
Monolith P. C. units[9]	1-23-31	10	12	
National Cem. (Can.) 1st 7's[43]	1-24-31	98½	100	
National Gypsum A com.	1-26-31	4¾	5¼	
National Gypsum pfd.	1-26-31	30½	32½	$1 Jan. 2
Nazareth Cement com.[26]	1-24-31	14	.....	
Nazareth Cement pfd.[26]	1-24-31	97	.....	
Newaygo P. C. 1st 6½'s[29]	1-14-31	100½	101	
New Eng. Lime 1st 6's[14]	1-23-31	No market		
N. Y. Trap Rock 1st 6's	1-26-31	96	.....	
N. Y. Trap Rock 7% pfd.[36]	1-10-31	95	.....	1.75 qu. Jan. 2
North Amer. Cem. 1st 6½'s	1-26-31	45	.....	
North Amer. Cem. com.[51]	1- 9-31	1½	2½	
North Amer. Cem. 7% pfd.[51]	1- 9-31	14	18	
North Shore Mat. 1st 5's[15]	1-27-31	95	.....	
Northwestern States P. C.[37]	1-23-31	98	.....	$2 Apr. 1
Ohio River Sand com.	1-26-31	.....	14	
Ohio River Sand 7% pfd.	1-26-31	.....	98	
Ohio River S. & G. 6's[16]	1-24-31	85	90	
Oregon P. C. com.[9]	1-23-31	9	13	
Oregon P. C. pfd.[9]	1-23-31	80	90	
Pacific Coast Aggr. com.[50]	1- 8-31	3	6	
Pacific Coast Aggregates pfd.	1-26-31	3	6	
Pacific Coast Cement 6's[5]	1-23-31	65	75	
Pacific P. C., new com.	1-23-31	12	.....	
Pacific P. C., new pfd.	1-23-31	68¼	75	1.62½c qu. Jan. 5
Pacific P. C. 6's[9]	1-23-31	97½	99	
Peerless Cement com.[21]	1-26-31	6	.....	
Peerless Cement pfd.[21]	1-26-31	70	75	1.75 Jan. 1
Penn.-Dixie Cement com.	1-26-31	4	4½	
Penn.-Dixie Cement pfd.	1-26-31	26⅛	30	
Penn.-Dixie Cement 6's	1-26-31	77	77⅞	
Penn. Glass Sand Corp. 6's	1- 9-31	100	102	
Penn. Glass Sand Corp. pfd.	1- 9-31	90	.....	1.75 qu. Jan. 1
Petoskey P. C.	1-26-31	5½	7	15c qu. Apr. 1
Port Stockton Cem. com.[9]	1-23-31	No market		
Riverside Cement com.	1-23-31	10	12	
Riverside Cement pfd.[20]	1-23-31	65	70	1.50 qu. Feb. 1
Riverside Cement, A[20]	1-23-31	10	14	15c qu. Feb. 1
Riverside Cement, B[20]	1-23-31	1	2	
Roquemore Gravel 6½'s[17]	1-24-31	98	100	
Santa Cruz P. C. com.	1-23-31	85	.....	$1 qu. Jan. 1 & $2 ex. Dec. 24
Schumacher Wallboard com.	1-23-31	8	12	
Schumacher Wallboard pfd.	1-23-31	16	21½	50c qu. Nov. 15
Southwestern P. C. units[44]	1-22-31	240	.....	
Standard Paving & Mat. (Canada) com.	1-26-31	15¼	15½	50c qu. Nov. 15
Standard Paving & Mat. pfd.	1-26-31	.....	80	1.75 qu. Nov. 15
Superior P. C., A	1-23-31	31½	32⅞	27½c mo. Feb. 1
Superior P. C., B	1-23-31	9½	10	25c qu. Dec. 20
Trinity P. C. units[37]	1-24-31	105	115	
Trinity P. C. com.[37]	1-24-31	32½	.....	
Trinity P. C. pfd.[29]	1-14-31	109	112	
U. S. Gypsum com.	1-26-31	41	42	40c qu. & 50c ex. Dec. 31
U. S. Gypsum pfd.	1-26-31	120	124	1.75 qu. Dec. 31
Wabash P. C.	1-26-31	20	.....	
Warner Co. com.[10]	1-24-31	31	32	50c qu. Jan. 15
Warner Co. 1st 7% pfd.[10]	1-24-31	97	100	1.75 qu. Jan. 1
Warner Co. 1st 6's[8]	1-27-31	95	96	
Whitehall Cem. Mfg. com.[36]	1-10-31	80	.....	
Whitehall Cem. Mfg. pfd.[36]	1-10-31	50	.....	
Wisconsin L. & C. 1st 6's[15]	1-27-31	95	.....	
Wolverine P. C. com.	1-26-31	3½	3¾	15c qu. Nov. 15
Yosemite P. C., A com.[9]	1-23-31	2	2½	

*See inactive securities on following page.

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Reading & Co., Youngstown, Ohio. [5]Smith, Camp & Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simon & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [42]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill. [50]Martin Judge Co., San Francisco, Calif. [51]Hemphill, Noyes & Co., New York City. [52]Nesbitt, Thomson & Co., Montreal.

National Gypsum Company

THE payment, by the National Gypsum Company, Buffalo, N. Y., of $1 a share on account of preferred dividend accumulations calls attention to the corporation's improved operating status. Reduced building activity has adversely affected the entire gypsum industry for the last several years, but despite the severe depression sales of the company for the first eleven months of 1930 were 10% ahead of the comparable 1929 total, according to an official statement. Earnings were also said to be ahead of preferred dividend for the period.

A net income of $108,312 or $4.12 a share on the $7 preferred stock was reported by the National Gypsum Company for the first six months of 1930, comparing with a net loss of $78,851 in the comparable 1929 period. It has been indicated that despite the long continued unsatisfactory situation in the building industry, with its adverse influence of the gypsum producers, National Gypsum has maintained a financial position. Cash resources are ample, and no bank loans are outstanding, according to a recent statement. No balance sheet is available of more recent date than October 31, 1929, when current assets of $1,406,135 included $488,883 of cash and call loans, and net working capital was $1.259,128. Total assets at that date were $7,296,339.

The capitalization of National Gypsum comprises $621,000 of sinking fund 6% bonds of 1943, $2,629,567 of $7 preferred stock, and $3,686,589 of common stock and surplus represented by 132,452 class A and 15,000 class B shares, on the basis of the October 31 financial statement. Dividend accumulations on the preferred stock amount to $20 a share, following the $1 payment on January 2. The last previous disbursement was $1.75 a share for the final quarter of 1927.—*Chicago Journal of Commerce.*

Called for Redemption

FRANKLIN FLUORSPAR CO. 6% notes, 1934, in the amount of $89,000, have been called for redemption on February 1, 1931, at 105, at the Union Trust Co., Pittsburgh, Penn.

Monolith Strengthens Position

COY BURNETT, president of Monolith Portland Cement Co., Los Angeles, Calif., told stockholders at the annual meeting that the company had materially strengthened its current position during the year ended December 31, 1930. Mr. Burnett said that current assets were 3.77 times current liabilities at the end of the year, as compared with a ratio of 2.1 times current liabilities at the end of the previous year. Mr. Burnett said:

"Figures now available show that bond interest earned, before taxes but after depreciation, was 2¼ times interest requirements on $973,000 6% first mortgage bonds outstanding. During the year the company retired $27,000 in par value bonds."

All officers and directors were re-elected at the meeting.

Gypsum and Lime Earnings in Canada

R. E. HAIRE, president and managing director of Gypsum, Lime and Alabastine, Canada, Ltd., in commenting on recent reduction in dividend rate to 80 c. a share annually, points out that Canadian business conditions, particularly in the Middle West, have not been as good as anticipated. Net earnings for 1930 will more than cover dividend at new rate, it is stated.

Cash position, according to the letter, is the strongest in the company's history, net current assets standing at nearly $1,700,000, including approximately $500,000 in cash, call loans and marketable securities, with current assets more than seven times current liabilities.

Mr. Haire adds that new operating economies, effective only in last two months of past year, should result in savings of several hundred thousand dollars a year.—*Wall Street* (New York) *Journal.*

Rock Asphalt Omits Dividend

THE directors of the Kentucky Rock Asphalt Co. recently voted to omit the quarterly dividend ordinarily payable January 1 on the common stock. From April 1, 1929, to and including October 1, 1930, quarterly distributions of 40 c. per share in cash were made, and on April 15, 1929, a 5% stock dividend was paid.

Superior Report for 1930

THE following is a summary of the financial statement for the year ending December 31, 1930, presented at the recent annual meeting of the Superior Portland Cement Co., Inc., Seattle, Wash.:

	1930
Net profit, after charges	$56,000
Earned per share, class A	$0.73
No. of class A shares	76,145
ASSETS	
Plant and realty	$5,141,880
Current assets:	
Cash	251,083
Inventories	777,463
Receivables	123,080
Investments	422,575
Deferred	142,299
Total	$6,358,380
LIABILITIES	
Capital and surplus	$6,213,318
Current liabilities:	
Accounts payable	18,751
Payrolls	12,004
Tax reserves	50,009
Other reserves	63,798
Total	$6,358,380
Current assets	$ 651,626
Current liabilities	80,764
Working capital	$ 570,862

Bessemer Limestone Bonds

THE Bessemer Limestone and Cement Co., Youngstown, Ohio, is said to be planning a bond issue in a refinancing program. The underwriting will be handled by a Cleveland bank.

Indiana Limestone

THE Indiana Limestone Co. in the year ended November 30, 1930, earned 30 c. a share on 7% preferred, compared with 20 c. a preferred share in the previous year.

Ideal Pays Quarterly Dividend

THE IDEAL CEMENT CO., Denver, Colo., paid a dividend of 75 c. a share for the last quarter of 1930, making a total disbursement of $343,703.25.

In addition to the dividend, the company paid out a total of $103,650 in 5% debenture interest.

Recent Dividends Announced

Bessemer Limestone and Cement Cl. A (qu.)	$0.75	Feb. 1
Missouri Portland Cement com. (qu.)	0.50	Jan. 31
Superior Portland Cement Cl. A (mo.)	0.27½	Feb. 1

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
American Portland Cement,[3] 100 shs., par $10	$100 for the lot	.....
American Portland Cement,[3] 400 shs., par $10	$400 for the lot	.....
American Portland Cement,[3] 100 shs., par $10	$75 for the lot	.....
Atlantic Gypsum Products 1st 6s, 1941 ($28,000)[2]	$7400 for the lot	.....
Blue Diamond Materials, 10 shs. pfd.[5]	$10 for the lot	.....
Florida Portland Cement (Del.),[3] 50 shs. com., no par and 50 pfd.	$450 for the lot	.....
Florida Portland Cement, 10 shs. pfd. and 5 shs. com.[6]	$100 for the lot	.....
Indiana Limestone, 200 shs. pfd. and 1000 com., no par[4]	$2000 for the lot	.....
Rockland and Rockport Lime, 330 shs. pfd., 85 2nd pfd. and 135 com.[10]	$55 for the lot	.....
Rockland and Rockport Lime Corp., 50 shs. 1st pfd.[11]	$40 for the lot	.....
Standard Rock Asphalt, 1200 shs. no par stock[4]	1¼	.....
Tory Hill Sand and Gravel, 13 shs. 8% pfd.[8]	$1 for the lot	.....
Tory Hill Sand and Gravel, 13 shs. com., no par[8]	$1 for the lot	.....
United Feldspar, 388 shs. pfd., 647 com.[9]	$1000 for the lot	.....
Universal Gypsum, 100 trustees cert., no par[7]	$1 for the lot	.....
Universal Gypsum, 500 shs. com., no par[9]	$12 for the lot	.....
Universal Gypsum and Lime, 300 shs.[1]	$4 for the lot	.....
Universal Gypsum and Lime, 200 shs.[3]	$2 for the lot	.....
Vulcanite Portland Cement, 300 shs. com., no par[8]	$425 for the lot	.....

[1]Price at auction by Adrian H. Muller & Son, New York, August 6, 1930. [2]Price at auction by Adrian H. Muller & Son, New York City, November 19, 1930. [3]Price at auction by Adrian H. Muller & Son, New York City, December 10, 1930. [4]Price at auction, Adrian H. Muller & Son, December 24, 1930. [5]Price at auction, R. L. Day & Co., Boston, December 17, 1930. [6]Price at auction, Barnes &L ofland, Philadelphia, December 17, 1930. [7]Price at auction, A. J. Wright & Co., Buffalo, December 17, 1930. [8]Price at auction, Adrian H. Muller & Son, December 17, 1930. [9]Price at auction, Adrian H. Muller & Son, December 31, 1930. [10]Price at auction, R. L. Day & Co., December 31, 1930. [11]Price at auction, Wise, Hobbs & Arnold, Boston, December 31, 1930.

Canada Cement Annual Report

THE CANADA CEMENT CO., Ltd., Montreal, Que., according to the annual report of its president, A. C. Tagge, had a fair year ending November 30. It is stated: The company has felt the effect of the world-wide business depression of the past year, and sales, both domestic and export, have fallen below those for 1929. The decreased consumption was most marked in the smaller class of buildings and the dealer trade. Increased efficiencies and economies in production and distribution have enabled it to compensate to a considerable extent for the reduction in volume.

The plants have been well maintained and are in excellent condition. Eight of the smaller kilns at the Montreal East plant are being replaced by four larger kilns and new grinding equipment. This change should result in better efficiency and economy when put into operation next spring.

The self-discharging boat purchased last year to carry bulk cement from our Montreal East plant to the storage and packing plants at Quebec and Halifax and to bring back gypsum from Nova Scotia has been in steady operation during the past season with very satisfactory results. Conditions, however, have been such that it was deemed advisable to postpone the building of the storage and packing plant at Saint John. This year another self-discharging boat built specially for service on the Great Lakes was purchased and put into operation to carry bulk cement from the plant at Belleville to storage and packing plants completed during the past year at Toronto and Windsor. This arrangement also is working out very satisfactorily.

The operating program laid out at the beginning of the year was carried on without interruption but the slowing up in the demand for cement has resulted in larger stocks of cement on hand than usual at this time of the year.

More than 70% of employes are now shareholders in the company or are paying for stock under the company's employes' stock distribution plan.

CANADA CEMENT CO., LTD., BALANCE SHEET, NOVEMBER 30, 1930

ASSETS

Current assets:			
Inventories		$ 2,411,163.90	
Accounts receivable (less bad debt reserve):			
Customers' accounts and bills receivable	$979,391.79		
Other accounts	108,187.60		
		1,087,579.39	
Deposits on tenders		60,794.10	
Deposits under Workmen's Compensation Commission		75,440.63	
Government bonds and other securities		198,204.00	
Call loan with trust company		500,000.00	
Cash		1,206,670.25	
			$ 5,539,852.27
Deferred charges to operations			87,094.35
Investments: In associated companies and other investments			6,097,783.54
Cost of properties: Land, buildings, plant, equipment, etc., less depreciation			39,897,498.47

LIABILITIES

Current liabilities:			
Accounts payable		$ 1,326,697.11	
Bond interest accrued and unpresented coupons		113,485.83	
Preference dividend No. 12, payable December 31, 1930		340,924.68	
			$ 1,781,107.62
Reserves:			
Fire insurance		$ 467,976.10	
Extraordinary repairs and renewals		75,000.00	
Cloth sacks outstanding		150,000.00	
Industrial accidents		62,900.00	
Contingent reserve (a portion of which is available for government income taxes)		399,443.92	
Preference stock sinking fund		13,908.87	
			1,169,228.89
First mortgage sinking fund gold bonds, 5½%, Series A, due 1947:			
Authorized		$30,000,000.00	
Issued		20,000,000.00	
Less: Redeemed through sinking fund		400,000.00	
			19,600,000.00
Purchase money obligations: Payable $300,000 per year for four years			1,200,000.00
Preference stock 6½% sinking fund cumulative:			
Authorized (of which $21,000,000 has been issued)		$25,000,000.00	
Outstanding			20,980,500.00
Preference stock redemption account: 195 shares redeemed and canceled			19,500.00
Common stock and surplus		$ 6,403,904.75	
Profit and loss account:			
Profit from operations for the year ending November 30, 1930, after making provision of $2,055,344.22 for depreciation of capital assets	$3,132,150.63		
Deduct:			
Bond interest	$1,098,166.67		
Fire insurance reserve	160,506.80		
Reserve for extraordinary repairs and renewals	25,000.00		
Reserve for industrial accidents	18,400.00		
Contingent reserve (for government income taxes, etc.)	250,000.00		
Preference stock sinking fund	14,062.40	1,566,135.87	
		$1,566,014.76	
Deduct: Dividend on preference stock		1,363,732.50	
		$ 202,282.26	
Balance of profits November 30, 1929		265,705.11	467,987.37
A total of			6,871,892.12
represented by 600,000 shares of no par value common stock out of an authorized issue of 750,000 shares.			
			$51,622,228.63

Riverside Cement Company's Annual Statement

THE Riverside Cement Co., Los Angeles, Calif., reports for the year ended December 31, 1930, net earnings, after all charges, including allowance for federal income taxes, of $509,279, equivalent, after preferred dividends, to 60 cents a share on the 240,000 shares of no par value class A stock outstanding.

This compares with net earnings of $1,013,085, equivalent, after preferred dividends, to $2.67 a share on the same number of class A shares in 1929.

The income account of Riverside Cement Co. compares as follows:

	1930	1929	*1928
Operating profit	$943,405	$1,519,818	$1,353,642
Depreciation and depletion	372,120	383,003	291,838
Federal taxes	62,006	123,730	127,017
Net profit	$509,279	$1,013,085	$934,787

*Eight months.

The consolidated balance sheet as of December 31, 1930, compares as follows:

ASSETS

	1930	1929	1928
Cash	$1,061,313	$1,622,701	$1,223,424
Stocks, bonds	396,812	398,301	.....
Notes and accts. rec., net	614,634	597,644	956,749
Inventories	896,166	901,639	1,036,532
Investments	310,785	308,952	*962,194
Def. charges	39,891	41,537	43,868
†Land, plant and equip.	8,529,127	8,774,321	8,028,256
Total	$11,848,731	$12,645,097	$12,251,023

LIABILITIES

Pay rolls, nts., accts. pay	$135,554	$296,355	$282,592
Res. for federal taxes	94,164	158,785	233,374
Sundry items	40,244	.....	.....
Other reserves	239,272	348,418	262,781
Capital stock	9,552,500	9,552,500	9,500,000
Surplus	1,786,995	2,289,037	1,972,276
Total	$11,848,731	$12,645,097	$12,251,023

*Includes stock and bonds. †After depreciation.

In his letter accompanying the annual statement to stockholders, John Treanor, president of the company, announces that directors have declared the usual quarterly dividend of $1.50 a share upon the preferred stock and a dividend of 15 cents a share on the class A stock, both dividends payable February 1 to stock of record January 15.

Dividends were regularly paid throughout 1930 on the preferred and class A shares. The A shares have priority to the extent of $1.25 a share cumulative dividends over the class B stock after payment has been made at the rate of $6 a share on the first preferred stock. No dividends have been paid on the class B stock of which there are 345,000 shares of no par value outstanding.

The declaration of a 15-cent dividend on the A stock in place of the usual quarterly dividend of 31¼ cents represents a reduction in the annual disbursement to class A stockholders from $1.25 a share annually to 60 cents a share.

The company reported a strong current financial condition, as of December 31, 1930, with current assets of $2,968,927, against total current liabilities of $229,719. Cash alone exceeded total current liabilities.—*Wall Street* (San Francisco, Calif.) *Journal.*

Hints and Helps for Superintendents

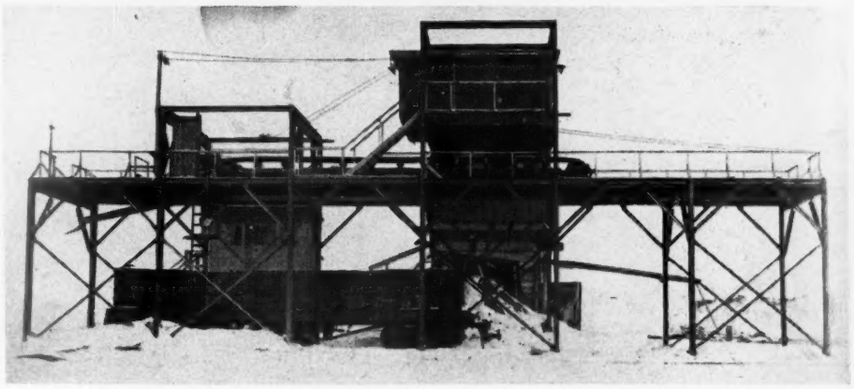
Cement Raw Materials Sampling Device

THE SANTA CRUZ PORTLAND CEMENT CO., Davenport, Calif., recently completed an elaborate installation for both raw and finish grinding of cement, using two-stage rolls for preparing the feed for Hardinge mills. The raw material is stored in 40 steel tanks, samples of which are taken as the tanks are being filled by a novel automatic sampler. The material sampled is minus 4-mesh.

At the discharge end of one of the belt conveyors handling this product there has been installed a mechanical device consisting of a receptacle in which a slot ½ in. by 1 ft. has been cut. This slot functions to cross the discharge stream of the raw mix every 50 seconds with the long axis of the slot at right angles to the discharge stream by means of a suitable set of gear trains. The rate of travel of this slot is such that approximately a 400-lb. sample is secured every 50 seconds.

The sample falls to the boot of a small bucket elevator that discharges to a series of Jones samplers, nine of them arranged one above the other so that each half as cut cascades to the sampler below. By the time the minus 4-mesh material passes the last sample cutter it is reduced to 2 lb. This final sample is then chuted to a container for the laboratory.

The nine Jones samplers are all housed within the bucket elevator. A Jones sampler is the conventional device used in most laboratories for cutting a sample into two portions by passing the material through a series of channels, half the stone passing to one side and half to the other.



Loading facilities at a Canadian aggregate plant

Unusual Car Loading Method

AN INTERESTING car-loading method is being used by a Canadian aggregate producer for loading railway cars with sand and gravel, as shown in the accompanying views.

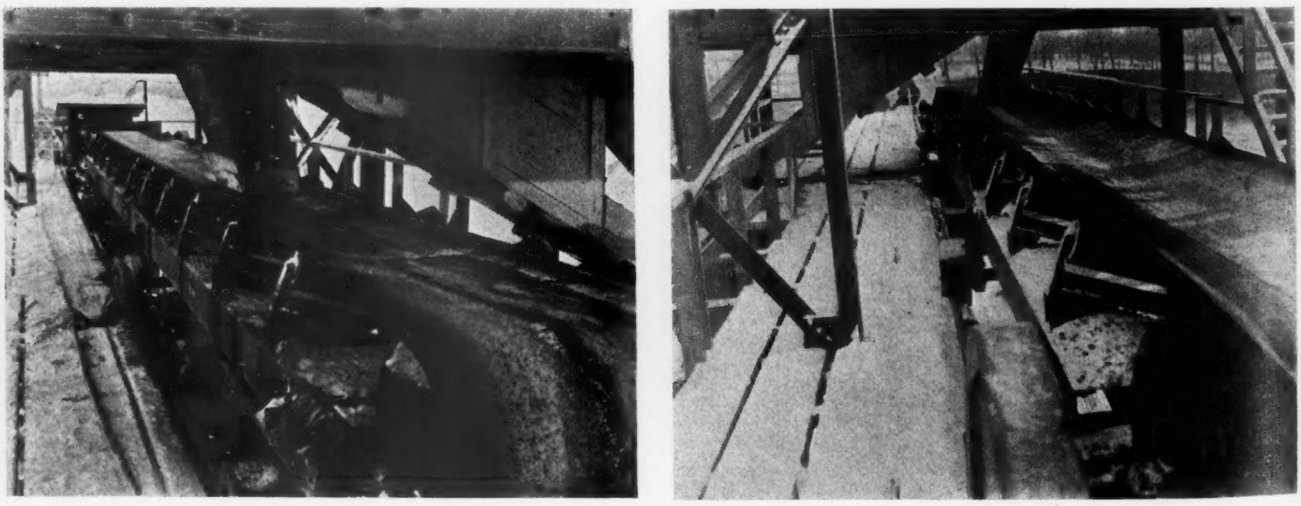
The material is carried on an inclined belt conveyor from the bins at the washing and screening plant to the car loading point, where it is spouted to a shuttle belt conveyor located on a framework above and parallel to the car.

This conveyor, 36 in. wide by 40 ft. long, is driven by an individual 5-hp. motor, and is mounted on wheels so that it may be moved back and forth on a track.

Thus, by moving the shuttle conveyor, the car is loaded without having to be switched during the loading operation. Also by such movement of the conveyor the material may be distributed so as to very much reduce any segregation, due to the larger sizes rolling to the outside.

The layout is such that the car is weighed during loading on a Fairbanks track scale of 120 tons capacity.

The installation is at the plant of the



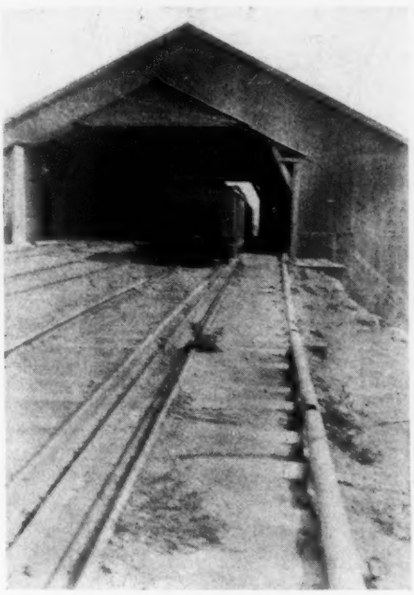
Two views of shuttle loading belt which is mounted parallel and over the gondola

Canadian Aggregates, Ltd., at Burford, Ontario, near Brantford. The conveyor was designed and furnished by the Link-Belt Co., Canadian division.

Cable Guards

THE CARS LOADED with limestone at the Santa Cruz Portland Cement Co., Davenport, Calif., plant are spotted near the crusher by the electric locomotive. The cars, as needed, are further shifted by means of "Little Tugger" hoists mounted near the crusher and under the control of the crusher operator.

The cable from the drum extends out to an anchored sheave and returns to the hoist



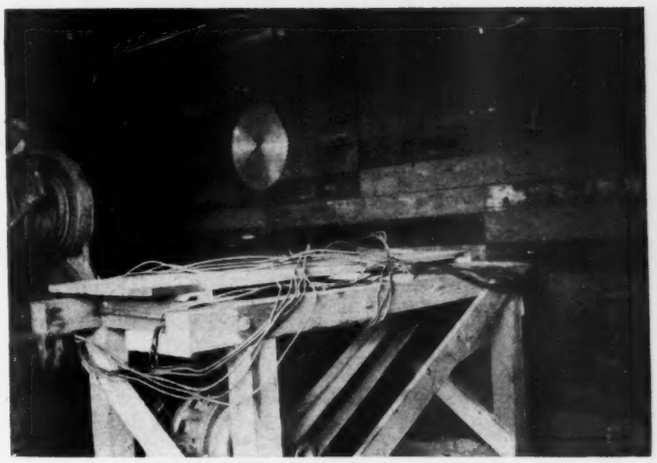
Slotted pipe protects the cable

through other sheaves, and to this cable are attached lugs that engage with the bottom of the car to facilitate its movement to the crusher. The half of the cable line to which the lugs are attached drags on the ground near the rail with the other half passing through a 2½-in. pipe in which, at frequent intervals, has been cut a wide slot for observation of the cable. The use of a pipe for the cable not only prevents unnecessary wear but is a protection against accidents to employes from whipping of the cable.

Portable Circular Saw for the Plant Shop

FOR THE SHOP at the sand plant or quarry, a circular saw has many uses. Such a saw can readily be made right at the plant, the only parts necessary to purchase being the saw blade and a small electric motor. The frame consists of a table having four legs which should be well braced, and fitted with a shelf to which the motor is clamped. The shaft for the blade is held in bearings fastened to the under side of the table surface, and a slot is cut in the table just large enough for the blade. A short belt from the motor to a pulley on the shaft supplies the power to the saw. The size of this pulley will depend on the desired speed of the saw and the actual speed of the motor.

To make this outfit of even greater use than a mere shop layout, it can readily be made portable. Skids are added. A longer electric cord is used so that the machine can be attached to any line about the plant as desired.



Portable circular saw installed on a wooden frame

Clinker Coolers

A PROMINENT cement manufacturer once stated that the first few days of operation of a rotary clinker cooler was its most efficient. He meant that due to the heat the lifter baffles soon became useless and would not lift and drop the clinker, a function that is necessary for efficient cooling in that type of cooler. Hence when the baffles ceased to be useful, he lined the entire cooler with fire brick and thus, while not changing the cooling efficiency, did increase the life of the cooler shell. Recently cast-steel alloys such as Pyrasteel have been developed that will stand temperatures and render service under conditions as found in a rotary clinker cooler.

Building Up Worn Crusher Mantles

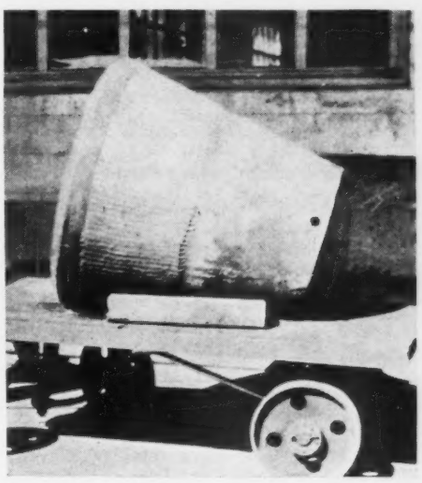
THE AVERAGE LIFE of a manganese-steel mantle at a California mining operation was about six months. At the end of this time the 2½-in. metal thickness is practically worn through. One of these castings was reclaimed by building up the worn surface with "Hascrome," a welding alloy of the Haynes Stellite Co. Ninety pounds of this material were used, requiring 25 hours of labor to apply it. The total cost of rebuilding, including overhead, amounted to slightly more than 25% of the cost of a new mantle. At the end of four months, this part, having crushed 28,000 tons of hard copper ore, showed but 5/32 in. of wear. It was again recoated and put in service.

Another mantle, reclaimed with this alloy, was examined at the end of three months. It had worn about ⅛ in. while crushing 21,000 tons of the same ore. This was also built up to the desired size.

In Salt Lake, a smelting company built up a two-piece crusher mantle, using 125 lb. of this alloy. It was put in service in December, 1929, and is still in perfect condition.

The welding procedure for resurfacing was in accordance with the standard practice for applying Hascrome by the electric arc method. Reverse polarity was used, namely, the ¼-in. rod was made the positive electrode. A current of from 200 to 250 amp. was found to be most desirable. It is not always necessary to use a flux coating on the rod; however, if a flux coating seems desirable, it can be readily made up by mixing some brazing flux with carbide sludge and water. Both methods of laying down the electric beads longitudinally and circumferentially have been tried, and from the results obtained, either procedure is satisfactory. However, general practice seems to favor the longitudinal bead; that is, parallel to the axis of the mantle.

Best results are obtained if the coating is applied at irregular intervals around the mantle, since there is less danger of warping the piece because by this method the welder will not get the casting too hot by concentrating the head at one point. It is more economical to build the worn surfaces after the mantle has been slightly reduced in size than to wait until the metal has been ground almost entirely away.



The reclaimed crusher mantle

Greatest Contest Ends With 43 Safety Winners

Portland Cement Association to Award Trophies to Record-Breaking Number

SMASHING all former results, the Portland Cement Association safety trophy contest for 1930 closed with forty-three winners.

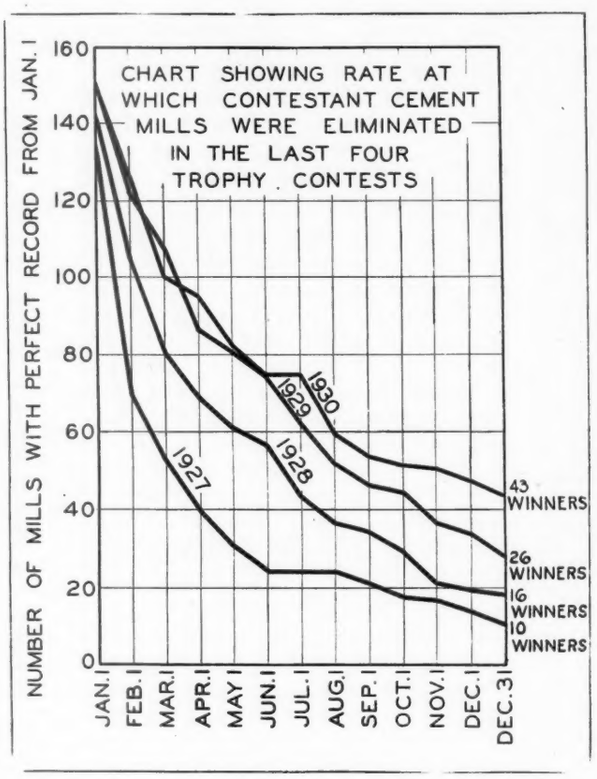
On the basis of early returns the successful contestants, all of which finished the calendar year without a single lost-time, permanent--disability or fatal accident, exceeded the combined number of winners for the two preceding years. Sixteen plants finished 1928 without chargeable accident and 26 completed 1929 with equally clear records. In view of these very commendable results, the number of 1930 winners seems little short of amazing and comes as a genuine surprise.

There was one award each year in 1923 and 1924; two awards in 1925 and two in 1926, and 10 in 1927. It is interesting to note that the 16 awards of 1928 equaled the total previous awards; the 26 awards for 1929 equaled the combined awards of 1927 and 1928; and that as noted above, the 43 1930 awards exceed by one the combined awards of 1928 and 1929.

Of the total number of awards (101) made since the contest was started in 1923, 42% were thus won during 1930. Of the total number of plants (58) which have received one or more annual awards, 72% won during the year just closed. Twenty-six plants operated a calendar year without accident for the first time in 1930.

Five of the winning plants for 1930 are located in the Lehigh Valley, five in New York state, nine in Pennsylvania, five in Ohio, three in Indiana, three in Texas, two in Michigan, two in Alabama, two on the Pacific Coast, three in Canada, and one in Cuba.

The Medusa Portland Cement Co. captured the honor among multiple plant operators of having the largest percentage of its plants win. The Medusa record for the year included seven plants without chargeable accident of any kind and one plant with only one lost-time accident. The Alpha Portland Cement Co. had seven winning plants out of a total of eleven; the Lehigh Portland Cement Co. finished the year with perfect records in eight of its seventeen plants. However, only seven of the perfect records will bring trophy awards as one of the plants with a clear safety record did not operate the minimum of six months required to win the trophy.



Of the 1930 winners the plant with the longest accident-free record is that of the Lehigh Portland Cement Co. at Iola, Kan., in which the last lost-time accident occurred on September 9, 1926. The Iola plant, with a record of 1574 safe days to its credit up to January 1, 1931, thus has four consecutive years of operation without the loss of a day's time through personal injury; and the Association trophy, first awarded to it at the end of 1927, is now to be reawarded for the third time.

The Cowell plant in California still holds the longest perfect safety record in the industry, amounting to 1645 days or slightly over 4½ years; but this was terminated by an accident on November 22 which caused a slight disability although no loss of time. Not a dollar has been lost to a pay envelope through accident at Cowell since May 21, 1926.

Another plant to finish four consecutive safe calendar years is the Ironton, Ohio, mill of the Alpha Portland Cement Co., where the last lost-time accident occurred on December 8, 1926. The record of this mill is unusual because its hazards include an extensive limestone mine. The largest mill organization to win the award for 1930 is the Pittsburgh plant of the Universal Atlas Cement Co., located at Universal, Penn. Approximately 1,307,000 man-hours were worked by this plant during 1930, making it the largest plant to which the award has ever been made.

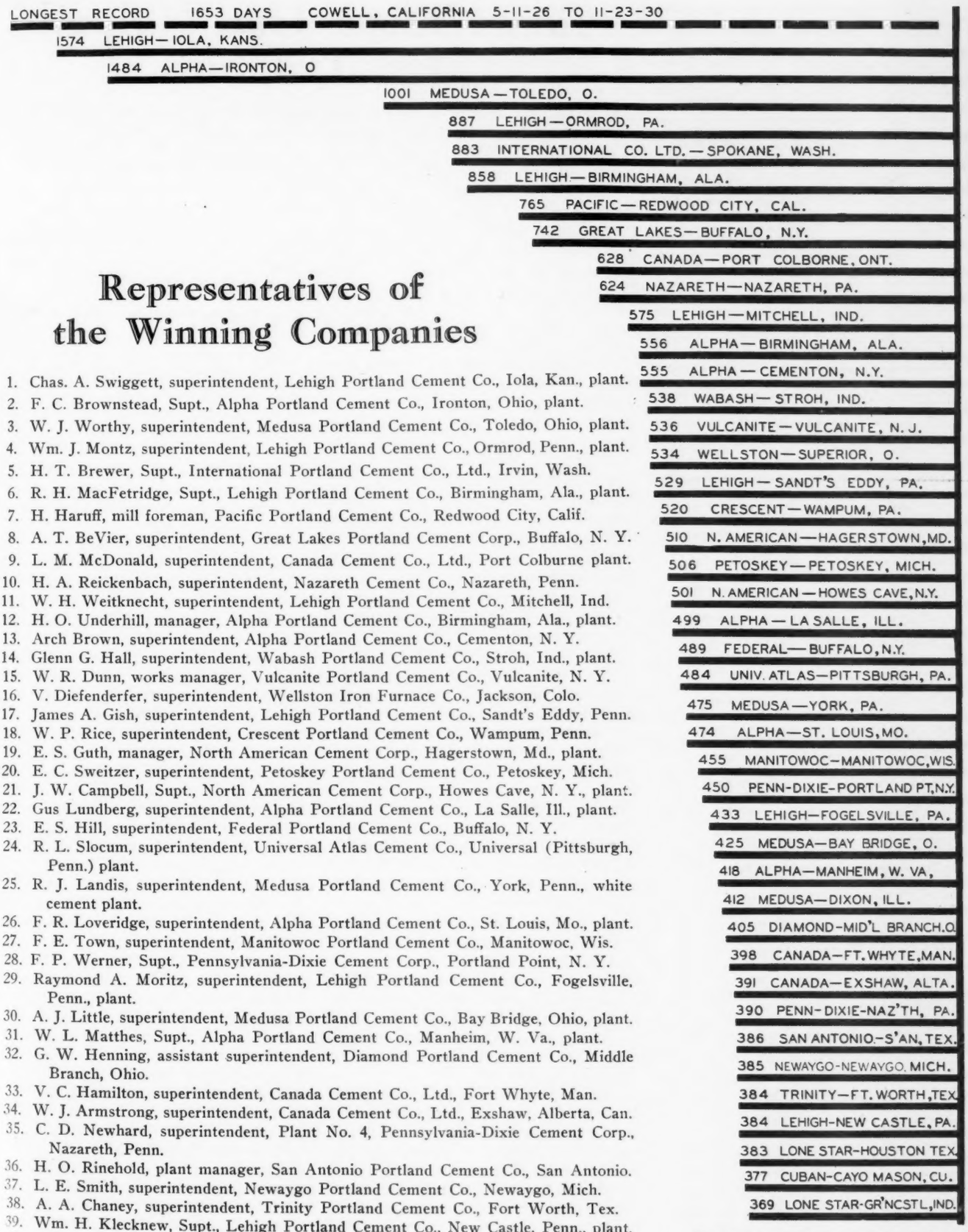
In addition to the 43 trophy winners for 1930, there were three additional plants which completed their year's operation with a perfect safety record but which could not qualify for the award because they did not meet the minimum operating requirement—that of producing clinker for an aggregate for at ltast six months. These plants will receive a distinguished service citation from the association.

Award a Real Prize

Since it was first offered in 1923, the Portland Cement Association safety award has been highly prized as the most distinguished honor bestowed within the industry. The rapidly growing number of awards attests the spirit with which the many mill organizations have struggled to attain it because of the esteem in which it is held wherever its significance is known.

Ordinarily, the award carries with it a handsome cast stone monument bearing the figures "Safety Follows Wisdom," in bas-relief, designed at the Art Institute of Chicago, and a trip to New York for two representatives selected by the plant to receive the formal award at the spring meeting of the Portland Cement Association.

Through the recent action of the Association in selecting Washington, D. C., for its spring meeting, the 1930 awards take on added significance, for they will carry with them trips for the plant representatives to the national capitol, where ample opportunity will be given to see the city, with its points of historical and patriotic interest; and the formal award will be made before a most distinguished audience.



Graph shows days operated without lost time, permanent disability or fatal accident. Vertical line at right represents January 1, 1931

Representatives of the Winning Companies

1. Chas. A. Swiggett, superintendent, Lehigh Portland Cement Co., Iola, Kan., plant.
2. F. C. Brownstead, Supt., Alpha Portland Cement Co., Ironton, Ohio, plant.
3. W. J. Worthy, superintendent, Medusa Portland Cement Co., Toledo, Ohio, plant.
4. Wm. J. Montz, superintendent, Lehigh Portland Cement Co., Ormrod, Penn., plant.
5. H. T. Brewer, Supt., International Portland Cement Co., Ltd., Irvin, Wash.
6. R. H. MacFetridge, Supt., Lehigh Portland Cement Co., Birmingham, Ala., plant.
7. H. Haruff, mill foreman, Pacific Portland Cement Co., Redwood City, Calif.
8. A. T. BeVier, superintendent, Great Lakes Portland Cement Corp., Buffalo, N. Y.
9. L. M. McDonald, superintendent, Canada Cement Co., Ltd., Port Colburne plant.
10. H. A. Reickenbach, superintendent, Nazareth Cement Co., Nazareth, Penn.
11. W. H. Weitknecht, superintendent, Lehigh Portland Cement Co., Mitchell, Ind.
12. H. O. Underhill, manager, Alpha Portland Cement Co., Birmingham, Ala., plant.
13. Arch Brown, superintendent, Alpha Portland Cement Co., Cementon, N. Y.
14. Glenn G. Hall, superintendent, Wabash Portland Cement Co., Stroh, Ind., plant.
15. W. R. Dunn, works manager, Vulcanite Portland Cement Co., Vulcanite, N. Y.
16. V. Diefenderfer, superintendent, Wellston Iron Furnace Co., Jackson, Colo.
17. James A. Gish, superintendent, Lehigh Portland Cement Co., Sandt's Eddy, Penn.
18. W. P. Rice, superintendent, Crescent Portland Cement Co., Wampum, Penn.
19. E. S. Guth, manager, North American Cement Corp., Hagerstown, Md., plant.
20. E. C. Sweitzer, superintendent, Petoskey Portland Cement Co., Petoskey, Mich.
21. J. W. Campbell, Supt., North American Cement Corp., Howes Cave, N. Y., plant.
22. Gus Lundberg, superintendent, Alpha Portland Cement Co., La Salle, Ill., plant.
23. E. S. Hill, superintendent, Federal Portland Cement Co., Buffalo, N. Y.
24. R. L. Slocum, superintendent, Universal Atlas Cement Co., Universal (Pittsburgh, Penn.) plant.
25. R. J. Landis, superintendent, Medusa Portland Cement Co., York, Penn., white cement plant.
26. F. R. Loveridge, superintendent, Alpha Portland Cement Co., St. Louis, Mo., plant.
27. F. E. Town, superintendent, Manitowoc Portland Cement Co., Manitowoc, Wis.
28. F. P. Werner, Supt., Pennsylvania-Dixie Cement Corp., Portland Point, N. Y.
29. Raymond A. Moritz, superintendent, Lehigh Portland Cement Co., Fogelsville, Penn., plant.
30. A. J. Little, superintendent, Medusa Portland Cement Co., Bay Bridge, Ohio, plant.
31. W. L. Matthes, Supt., Alpha Portland Cement Co., Manheim, W. Va., plant.
32. G. W. Henning, assistant superintendent, Diamond Portland Cement Co., Middle Branch, Ohio.
33. V. C. Hamilton, superintendent, Canada Cement Co., Ltd., Fort Whyte, Man.
34. W. J. Armstrong, superintendent, Canada Cement Co., Ltd., Exshaw, Alberta, Can.
35. C. D. Newhard, superintendent, Plant No. 4, Pennsylvania-Dixie Cement Corp., Nazareth, Penn.
36. H. O. Rinehold, plant manager, San Antonio Portland Cement Co., San Antonio.
37. L. E. Smith, superintendent, Newaygo Portland Cement Co., Newaygo, Mich.
38. A. A. Chaney, superintendent, Trinity Portland Cement Co., Fort Worth, Tex.
39. Wm. H. Klecknew, Supt., Lehigh Portland Cement Co., New Castle, Penn., plant.
40. Carl J. Lofstedt, superintendent, Lone Star Cement Co. Texas, Houston, plant.
41. W. E. Wuerth, superintendent, Medusa Portland Cement Co., Dixon, Ill., plant.
42. John Rae, superintendent, La Compania Cubana de Cemento Portland, Cayo Mason, Cuba.
43. R. J. Ellidge, superintendent, Lone Star Cement Co. Indiana, Greencastle, Ind.

The Portland Cement Association has made large additional appropriations to cover the added expense of the extra monuments and trips.

Contest Credited with Substantial Improvement

Much of the substantial improvement made in the safety record of the cement industry during the last few years may be credited to the Association's annual contest, according to the consensus of opinion among executives and men. The improvement in the records of the 1930 winners is cited as a concrete example.

Five years ago—during the year 1926—the records of the Portland Cement Association show that there were 14 fatal and 406 lost-time accidents in 40 of the 46 plants which had no accidents whatever in 1930. This group of mills which won the trophy in 1930 stood at the head of the list in 1926, notwithstanding that they suffered 14 fatalities with a severity total of 84,000 days and 8,379 days actually lost.

While the economic loss suggested by these figures could not be estimated with any reasonable accuracy, an interesting speculation will serve to impress the fact that it was large:

If each death cost $5,000 the fatality cost was	$ 70,000
If each lost day cost $5 the total would be	41,895
If investigation and reporting cost $25 per accident the total would be	10,500
Total of these three illustrative items	$122.395

If it were possible to evaluate the losses accurately, then adding proper amounts for interruptions and loss of efficiency in plants, legal and medical expense, mechanical damage, and other accountable losses, still according to authorities there would remain further losses perhaps four times as great.

These figures will serve roughly to suggest that in addition to the humanitarian purposes being served in this contest, the savings in dollars and time amount to no mean consideration.

Handling Explosives

E. I. du Pont de Nemours & Co., Inc., in its December, 1930, *Explosives Service Bulletin,* has published safety precautions in connection with handling explosives, particularly in connection with the transfer of explosives from the car to the quarry magazine.

Unloaders are cautioned to use great care in the event containers are broken, resulting in loose dynamite being scattered around the car floor. Other precautions with which every quarryman should familiarize himself thoroughly are also given. The article prescribes methods for loading bore holes, handling primers, tamping bore holes, firing shots, secondary blasting, and references as to methods of handling misfires.

Some Ideas That Helped Win Trophies

A YEAR ago, John O'Callaghan, assistant superintendent of the Lone Star plant at Greencastle, Ind., one of the 1930 trophy winners, wrote concerning plans for the 1930 safety campaign, which proved successful:

"We do not have any exactly new ideas to advance at this time as we believe that if only a few of the old ideas could be permanently instilled in the minds of the plant personnel our not-so-good accident record would be considerably reduced if not entirely eliminated.

"We plan to carry our year's safety campaign in practically the same manner as heretofore, except that we will require our foremen to take more responsibility concerning the enforcement of safety rules and safety conditions in general.

"We will adhere strictly to our good-housekeeping policy, which means keeping the plant and surroundings clean, orderly, and well lighted. In our opinion this is the first step needed for a well balanced safety program, because it shows the personnel that the management has their safety interests really at heart else they would not be willing to spend the extra money needed to keep the plant clean.

"We have a safety director and committee and they meet once each month and discuss safety problems and make practical safety recommendations. Records of their meetings are passed on to the superintendent and he makes final disposition of their deliberations. The plant is divided into nine departments as follows: Quarry, First Mill Shift, Second Mill Shift, Burning, Machine Shop, Packing and Loading, Yard, Construction, Office and Laboratory. Each department has a representative on the above mentioned committee.

"The safety director is also a competent first-aid instructor and he has a class in first aid going continually.

"Monthly mass safety meetings are held each month on the company's time. The entire plant personnel attends these meetings. An effort is made to have outside speakers talk to the men on safety or kindred subjects.

"We have had a safety bonus plan for the past four years and it works as follows:

"To a department going its first calendar year without a lost-time accident each man in that department receives a $10.00 cash bonus. If the department should go two years without a lost-time accident each man will get $20.00, three years $30.00, four years $40.00, and five years $50.00. No provision has been made for the sixth year or the years after that as yet.

"We are planning a physical examination for all of our present personnel as well as the new ones we employ. Details of this examination have not been worked out as yet but we expect to start the examinations within the next few months.

"The above is a broad outline of our 1930 safety campaign plan and covers the major points. We at all times endeavor to keep the safety idea before our men and insist that they maintain vigilance every minute that they are on the job."

How Medusa Won Seven Out of Eight!

W. M. Powell, safety director of the Medusa Portland Cement Co., on February 7, 1930, outlined the campaign which, followed throughout the year, resulted in the winning of seven trophies within the circle of the eight Medusa plants. Mr. Powell said:

"For the year 1930 we hope to standardize the manner in which the prospective employe is interviewed and introduced to his job at all our plants.

"We are adopting a set of general rules applying to safety which will be posted in the plants. These rules were drawn up by me and sent to the various plant safety committees for criticism and any additions they might see fit to make.

"Our plant committee is composed of the foremen but from time to time operators and mechanics are invited to sit in at the regular meetings. On two plants the committee members rotate as chairman, each serving for one month.

"One of our plants is trying out regular departmental safety meetings with the foreman as chairman and attendance of all employes in that department is compulsory unless previously excused. We know that general mass meetings of employes and their families create the right spirit. We have held meetings of this kind and expect to have more of them during the coming year.

"We have a safety flag which we keep flying until an accident occurs; then the foreman of the department in which the injury occurs has to lower it until the end of the month, when it is again raised.

"One of our plants has what amounts to a flag raising and lowering ceremony morning and night, different men being appointed to this task by the superintendent each day.

"A scoreboard showing the score of all departments, day by day, is posted in a conspicuous place and is kept up to date.

"An attractive metal enameled sign is placed in each department on which is marked each day the number of days which that department has operated without a lost-time accident.

"I believe that the safety director should have contact with and know every man in

Figures above photo indicate number of

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OF
1930 Safet Trophy
PORTLAND CEMENT AS

Figures above photo indicate number of days

r of days without accident.

the plants. I visit our plants at regular intervals and believe I know personally and have talked safety to every worker in our organization, individually.

"The Bureau of Mines first-aid training will form a part of our program for 1930."

Largest Winner Uses This Plan

J. R. Cline, assistant superintendent of the Universal Atlas plant at Universal, Penn. (near Pittsburgh), provided the following outline of the plan adopted January 1, 1930, by the biggest mill to win the trophy:

"The assistant superintendent is in active charge of all mill operation and the promotion of safety is a part of operation. Here an intimate connection is made with all operations and constant observation that they are being conducted in a safe manner. A weekly meeting is held with the heads of departments and leading foremen at which the record of the past period is gone into in detail; review of any special or investigating committees heard; discussion of any requests for changes or improvements for safety carried on and reading of any accidents that occurred outside the plant that would help us avoid similar accidents in the plant. This group is the plant general safety committee.

"Each foreman in every department of the plant is instructed to hold group meetings of his men so that every man attends at least one safety meeting a month. A special group called safety officers, consisting of about one member for each twenty employes, appointed to the group for a year, meet, one-third of the number each week, so all turns are represented each three weeks, and discuss all phases of safety for the betterment of the plant.

"At all of these meetings mentioned, minutes are kept and every safety suggestion is written up separately. If practical it is immediately taken care of. If the suggestion requires further consideration it is presented at the next meeting of the general safety committee and disposed of there.

Committee Inspects Twice a Year

"Each spring and fall a special committee of five specially trained foremen is appointed and they thoroughly inspect the plant, paying particular attention to structures, machines, wiring, also reporting any general unsafe condition they might observe. This committee requires about a week to make a thorough inspection.

"For 1930, in addition to all the above, a group of five leading men or gang leaders from as many departments are appointed for a month to make inspection of plant; thoroughly study company rule book and at end of month make report specifically stating where any unsafe practices or violations of rules have been noted by them.

"The basis of all safety work at this plant is that the foreman is responsible for all accidents. It is up to him to issue daily instructions to all his men regarding the safe method of working and then see that his instructions are carried out."

Plans Which Won for the Fourth Year

After winning the Portland Cement Association safety trophy for 1927, 1928 and 1929, the Alpha plant at Ironton, Ohio, of which F. C. Brownstead is superintendent, made the following plans one year ago, with the object of winning the trophy again in 1930:

"At the beginning of this year our plant safety committee was reorganized with the foremen or the heads of the various departments serving as its members, as it has been for the past three years.

"A schedule was outlined assigning each man and his department to have charge of all safety activities for a certain month. For example: The mine foreman and the men in his department are held responsible for all the safety work for the entire plant during the month of March. At the regular monthly meeting he acts as chairman, conducts the meeting, handles the business and gives a survey of his doings while in charge.

"In cases where the departments are small, several are grouped together. Outside of these monthly appointed chairmen and committees we have our permanent chairman and committees.

Spirits at High Pitch

"It is surprising how this plan has kept our safety spirits at a high pitch and has made our meetings more interesting. This system puts its directly up to each foreman and it makes him go about his work with added zeal for he doesn't want anything to happen while he has charge. It also makes friendly competition, as each foreman will try to conduct his affairs better than the preceding one. This arrangement also has a tendency to keep us from getting into a rut and helps to destroy that evil of too much self-assurance.

"Recently we have installed departmental safety bulletin boards along with our regular boards which display safety posters. Each board is made so that at a glance it reveals the condition of the department. If an unsafe condition prevails in a certain department a report of it is made, one copy is posted on this board and one given to the foreman. Then a flag with the emblem of skull and cross-bones showing that danger lurks there is also placed on this board. The report and flag remain until the condition is remedied and O. K.'d by the permanent plant committee chairman. This hurries along the completion of all recommendations as the department men don't want the unsightly flag displayed. If an unsanitary condition exists the same measures are taken, only a different flag is used. If the department is in a safe and clean condition a flag with a white cross on a green background is shown.

"No elaborate program is carried on at our plant. The methods we use are similar to those used in most plants and the 1178 days we have gone without a lost-time accident only serve as an inspiration for even greater accident prevention effort in the future."

Successful Plan Followed at Cuban Mill

La Compania Cubana de Cemento Portland, the Cuban member mill of the Portland Cement Association, which won the 1930 trophy, announced the following plan at the beginning of that year and followed it to success.

"A general safety committee has been formed, consisting of twelve members, one from each department in this plant. This committee has been divided into four subcommittees, with three members each.

"The four sub-committees act during separate weeks in rotation, and their duties are to carry out two inspections, one at the beginning of the week and another at the end. The departments inspected are those to which the members belong, so that each department is inspected by the foreman in charge and the other two members of the sub-committee.

"After the first inspection is carried out a report of their findings and suggestions is prepared, and at the time of their second inspection they check over their recommendations, in order to ascertain whether they have been complied with, and a final report is prepared and submitted to the general safety committee.

"In the above manner a thorough inspection of each department is made every month, and a general discussion of the reports submitted by the sub-committee is made at the meetings of the general safety committee. At these meetings a committee of four members, one from each subcommittee, will be appointed to carry out a general inspection of all departments.

"A mass safety meeting will be held on or about the first of each month, each of the twelve departments taking charge of these meetings in turn for a given month, following a program of speeches, safety displays or first aid demonstrations.

"A first aid team has also been organized. A man from each shift in each department forms part of the team, so that in case of an accident it will always be possible to have a trained member of the team near the scene. Weekly training practices are held for all members of the team.

"A monthly safety bulletin is published in Spanish, for distribution among all employes, which deals with general safety topics, safety notices and records, and other matters of interest for the workmen.

"By the faithful observance of the program above outlined, we hope to achieve a perfect safety record for the Cuban plant during the year 1930."

Cement Association Plans 1931 Safety Meetings

Success of 1930 Series Leads to Regional Conferences for Fifth Year

SAFETY in the cement mills and quarries of its members will be the basic theme at fourteen regional meetings or conferences to be conducted during 1931 by the Portland Cement Association. Co-operating in the meetings will be the United States Bureau of Mines, the National Safety Council, and officials of the labor and insurance departments of the various states included in each region.

The forthcoming series of annual meetings, which is the fifth since the cement association has been concentrating on the group meeting plan, will reach more than 95% of the member cement plants and will have an estimated total attendance of over 2000. Program features are being so arranged that practically all of the 150 plants represented will report on safety work done by their organizations and in addition approximately 100 papers on accident prevention subjects will be prepared and presented by practical mill and quarry men.

More than usual attention will be paid in the forthcoming series to first-aid contests. During the past two years the mill organizations have produced many "crack" first-aid teams, some of which have already carried away laurels in local contests. Now the big contests of the year are to take place at the regional safety meetings, with handsome cups, regional championship titles and in some cases cash prizes to the winners. United States Bureau of Mines officials, assisted by committees of local judges, will be in charge at each meeting.

A number of distinguished safety engineers connected with the electrical, explosives, railroad, insurance and other industries have already generously consented to assist at several of the meetings, bringing to the cement industry some of the most successful ideas and methods in use by them. At many of the meetings local officials have been invited to discuss briefly community safety problems and means by which the cement mill safety organizations can extend their good influence out into the surrounding community.

The annual safety dinner at each of these meetings is a feature at which good fellowship prevails and the pledge to carry on more faithfully than ever is annually renewed.

Of the meetings scheduled for the first part of the year two have already taken place, one at Dallas, Texas, January 22, and the other at Birmingham, Ala., January 27.

At the Dallas meeting O. V. Bartholomew, general superintendent of the Trinity Portland Cement Co., acted as chairman, and Alexander U. Miller represented the U. S. Bureau of Mines. Mills were represented as follows: Lone Star Cement Co., Texas, at Dallas and Houston; San Antonio Portland Cement Co., at San Antonio; Southwestern Portland Cement Co., El Paso; Trinity Portland Cement Co., at Dallas, Fort Worth and Houston, and Universal Atlas Cement Co., at Waco.

At the Birmingham meeting, R. H. MacFetridge, superintendent of the Birmingham plant of the Lehigh Portland Cement Co., acted as chairman, and F. E. Cash represented the U. S. Bureau of Mines. Mills were represented as follows: Alpha Portland Cement Co., Birmingham, Ala.; Cumberland Portland Cement Co., Cowan, Tenn.; Hermitage Portland Cement Co., Nashville, Tenn.; Lehigh Portland Cement Co., Birmingham, Ala.; Lone Star Cement Co. Alabama, Birmingham and Spocari, Ala.; Lone Star Cement Co. Louisiana, New Orleans, La., and St. Stephens, Ala.; Pennsylvania-Dixie Cement Corp., Richard City and Kingsport, Tenn., Bristol, Va., and Clinchfield, Ga.; Southern States Portland Cement Co., Rockmart, Ga.; Universal Atlas Cement Co., Leeds, Ala., and Volunteer Portland Cement Co., Knoxville, Tenn.

Louisville, Thursday, February 12. Sessions, 10 to 12 a. m. and 2 to 5:30 p. m with luncheon at 12:15 p. m. and dinner at 6:30 p. m., at Hotel Kentucky. W. H. Forbes will represent the Bureau of Mines. Mills will be represented as follows: Alpha Portland Cement Co., Ironton, Ohio; Kosmos Portland Cement Co., Kosmosdale, Ky.; Lehigh Portland Cement Co., Mitchell, Ind.; Lone Star Cement Co. Indiana, Greencastle, Ind.; Louisville Cement Co., Speed, Ind.; Southwestern Portland Cement Co., Osborn, Ohio; Wabash Portland Cement Co., Osborn, Ohio, and Wellston Iron Furnace Co., Superior, Ohio.

St. Louis, Mo., Tuesday, February 24. Sessions 10 to 12 a. m. and 2 to 5:30 p. m. with luncheon at 12:15 p. m. and dinner at 6:30 p. m. at the Coronado Hotel. F. R. Loveridge, superintendent of the St. Louis plant of the Alpha Portland Cement Co., will act as chairman. Claude P. Dempsey will represent the U. S. Bureau of Mines. The following mills will be represented: Alpha Portland Cement Co., St. Louis, Mo.; Missouri Portland Cement Co., St. Louis, Mo., and Universal Atlas Cement Co., Hannibal, Mo.

Washington, D. C., Tuesday, March 10. Sessions 10 to 12 a. m. and 2 to 5:30 p. m. with luncheon at 12:15 p. m. and dinner at 6:30 p. m. at Hotel Raleigh. W. M. Powell, safety director, Medusa Portland Cement Co., will act as chairman. Daniel Harrington, chief engineer, will represent the U. S. Bureau of Mines. The following mills will participate: Lehigh Portland Cement Co., Fordwick, Va., and Union Bridge, Md.; Lone Star Cement Co. Virginia, Norfolk, Va.; Medusa Portland Cement Co., York, Pa., and North American Cement Corporation at Hagerstown, Md., and Martinsburg, W. Va.

Kansas City, Mo., Thursday, March 19. Sessions 10 to 12 a. m. and 2 to 5:30 p. m. with luncheon at 12:15 p. m. and dinner at 6:30 p. m. at Kansas City Athletic Club. C. M. Carman, superintendent, Universal Atlas Cement Co., Independence, Kans., will act as chairman. W. D. Ryan, safety commissioner, will represent the U. S. Bureau of Mines. The following mills will participate: Ash Grove Lime and Portland Cement Co., Chanute, Kans., Louisville, Nebr., Ash Grove, Mo., and Galloway, Mo.; Dewey Portland Cement Co., Dewey, Okla.; Lehigh Portland Cement Co., Iola, Kans.; Lone Star Cement Co. Kansas, Bonner Springs, Kans.; Missouri Portland Cement Co., Independence, Mo.; Monarch Cement Co., Humboldt, Kans., and Universal Atlas Cement Co., Independence, Kans.

Davenport, Iowa, Thursday, April 2. Sessions 10 to 12 a. m. and 2 to 5:30 p. m. with luncheon at 12:15 and dinner at 6:30 p. m. at Hotel Blackhawk. H. F. Tyler, vice president of the Dewey Portland Cement Company, will act as chairman. Claude P. Dempsey will represent the U. S. Bureau of Mines. The following mills will participate: Alpha Portland Cement Co., La Salle, Ill.; Dewey Portland Cement Co., Davenport, Ia.; Hawkeye Portand Cement Co., Des Moines, Ia.; Lehigh Portland Cement Co., Mason City, Ia., and Oglesby, Ill.;

Medusa Portland Cement Co., Dixon, Ill.; Northwestern States Portland Cement Co., Mason City, Ia., and Gilmore City, Ia.; Pennsylvania-Dixie Cement Corp., Des Moines, Ia., and Universal Atlas Cement Co., Buffington, Ind., and Duluth, Minn.

Albany, N. Y., Tuesday, April 14. Sessions 10 to 12 a. m. and 2 to 5:30 p. m. with luncheon at 12:15 p. m. and dinner at 6:30 p. m. at Hotel Ten Eyck. S. P. Howell will represent the U. S. Bureau of Mines. The following mills will participate: Alpha Portand Cement Co., Cementon, N. Y., and Jamesville, N. Y.; Canada Cement Co. Ltd., Montreal, P. Q., and Hull, P. Q.; Glens Falls Portland Cement Co., Glens Falls, N. Y.; Lawrence Portland Cement Co., Thomaston, Me.; Lehigh Portland Cement Co., Alsen, N. Y.; Lone Star Cement Co. New York, Hudson, N. Y.; National Cement Co., Montreal, P. Q.; North American Cement Corp., Howes Cave, N. Y., and Catskill, N. Y.; Pennsylvania-Dixie Cement Corp., Portland Point, N. Y., and Universal Atlas Cement Co., Hudson, N. Y.

Pittsburgh, Pa., Friday, April 17. Sessions at 10 to 12 a. m. and 2 to 5:30 p. m. with luncheon at 12:15 p. m. and dinner at 6:30 p. m. at the William Penn Hotel. J. J. Forbes, chief safety engineer, will represent the U. S. Bureau of Mines. Following are the mills which will participate: Alpha Portland Cement Co., Manheim, W. Va.; Bessemer Limestone and Cement Co., Bessemer, Pa.; Canada Cement Co. Ltd., Port Colborne, Ont.; Crescent Portland Cement Co., Wampum, Pa.; Diamond Portland Cement Co., Middle Branch, Ohio.; Federal Portland Cement Co., Buffalo, N. Y.; Great Lakes Portland Cement Corp., Buffalo, N. Y.; Lehigh Portland Cement Co., New Castle, Pa.; Pittsburgh Plate Glass Co., Fultonham, Ohio; Medusa Portland Cement Co., Bay Bridge and Toledo, Ohio; Universal Atlas Cement Co., Universal, Pa., and West Penn Cement Co., Butler, Pa.

Detroit, Michigan, Tuesday, May 12. Sessions 10 to 12 a. m. and 2 to 5:30 p. m. with luncheon at 12:15 p. m. and dinner at 6:30 p. m. at Book-Cadillac Hotel. George W. John, assistant superintendent, Petoskey Portland Cement Co., will act as chairman. S. P. Howell will represent the U. S. Bureau of Mines. Participating mills are as follows: Alpha Portland Cement Co., Bellevue, Mich.; Huron Portland Cement Co., Alpena, Mich., and Detroit, Mich.; Ford Cement plant, Detroit, Mich.; Manitowoc Portland Cement Co., Manitowoc, Wis.; Newaygo Portland Cement Co., Newaygo, Mich.; Peerless Cement Corp., Detroit, Mich., and Port Huron, Mich.; Petoskey Portland Cement Co., Petoskey, Mich.; Wabash Portland Cement Co., Stroh, Ind.; Wolverine Portland Cement Co., Coldwater, Mich., and Quincy, Mich., and Wyandotte Portland Cement Co., Detroit, Mich.

Allentown, Pa., Friday, May 15. Session 1:30 to 5:30 p. m. with dinner at 6:30 p. m. at Hotel Americus. W. D. Walker will represent the U. S. Bureau of Mines. The following mills will be represented: Allentown Portland Cement Co., Evansville, Pa.; Alpha Portland Cement Co., Martins Creek, Pa.; Giant Portland Cement Co., Egypt, Pa.; Hercules Cement Corp., Stockertown, Pa.; Lawrence Portland Cement Co., Siegfried, Pa.; Lehigh Portland Cement Co., Bath, Pa., Fogelsville, Pa., Ormrod, Pa., Sandt's Eddy, Pa., and West Coplay, Pa.; Nazareth Cement Co., Nazareth, Pa.; Pennsylvania-Dixie Cement Corp., Nazareth, Pa., and Bath, Pa.; Lone Star Cement Co. Pennsylvania, Nazareth, Pa; Universal Atlas Cement Co., Northampton, Pa., and Coplay, Pa.; Valley Forge Cement Co., West Conshohocken, Pa., and Vulcanite Portland Cement Co., Vulcanite, N. J.

Oregon-Washington-British Columbia Meeting. Time and place not yet agreed upon.

Applying Safety Principles to Small Plants

THE tenth report in a series devoted to industrial safety, "Safety Activities in Small Companies," has just been issued by the Policyholders Service Bureau of the Metropolitan Life Insurance Co. The publications in this series are based upon a study of the field of safety engineering and are designed to present the principles governing successful accident prevention work, as well as tested methods of apply them.

In the current study the subjects of the nine previous reports have been summarized with particular reference to their application to small industrial properties. According to the report, investigations indicate that in general the accident frequency rate in small plants is relatively higher than in large organizations. This situation is stated to be probably due to the fact that whereas many of the larger establishments conduct some type of safety activity, comparatively few of the small properties have developed definite accident prevention programs.

The report proceeds to review some of the effective safety operations which can be developed and conducted by the executives and supervisory force of small plants as a part of their regular duties, and in a manner which will not impose any undue burden upon the organization. A chart in the front of the publication, based on the 1929 experience of more than 6,000 industrial establishments in Pennsylvania, shows the relation existing between the size of a property as measured by the number of employes and the accident frequency rate.

Mills with One Lost-Time Accident During 1930

Alpha Portland Cement Co., Bellevue, Ohio.
Ash Grove Lime and Portland Cement Co., Chanute, Kan., and Louisville, Ky.
Universal Atlas Cement Co., Northampton, Penn., Nos. 2 and 3; Waco, Tex., No. 3, and Duluth, Minn.
Canada Cement Co., Ltd., Hull, Que.
Consolidated Cement Corp., Mildred and Fredonia, Kan.
Cowell Portland Cement Co., Cowell, Calif.
Florida Portland Cement Co., Hooker's Point, Fla.
Giant Portland Cement Co., Reliance, Penn.
Hercules Cement Corp., Nazareth, Penn.
Lehigh Portland Cement Co., Mason City, Ia., and Ormrod, Penn., No. 3.
Lone Star Cement Co. Alabama, Spocari, Ala.
Lone Star Cement Co. Pennsylvania, Nazareth, Penn.
Louisville Cement Co., Speed, Ind.
Medusa Portland Cement Co., York, Penn. (grey).
Northwestern States Portland Cement Co., Gilmore City, Ia.
Pennsylvania-Dixie Cement Corp., Clinchfield, Tenn.
Superior Portland Cement, Inc., Concrete, Wash.
Three Forks Portland Cement Co., Trident, Colo.
Wabash Portland Cement Co., Osborn, Ohio.
Wolverine Portland Cement Co., Coldwater, Mich.

Erratum

IN the January 3, 1931, issue of ROCK PRODUCTS, on page 124, we stated that the Best Brothers Keene's Cement Co. introduced in 1930 a new "flat finish" Keene's cement. This should have read "fast finish."

It is said that this new fast working gypsum plaster sacrifices none of the characteristics of Best Brothers Keene's cement and assures its users a speed of workability that will be appreciated by users of the slower setting type of Keene's cements.

Rubber Goods Catalog

VARIOUS rubber goods products used in the rock products field are illustrated and described in catalog No. 30, recently issued by the New York Belting and Packing Co., Passaic, N. J.

Belting, water, steam and air hose, rod and sheet packings of various types, gaskets, rubber tubing, washers, rubber mats, rubber bonded grinding wheels, hose couplings, nozzles, clamps, etc., are included in the 216-page book, along with formula and tables on power tranmission by belts.

Portland Cement in December—and Preliminary Totals for the Year

Summary of Estimates by Months and Districts, 1930

THE PORTLAND CEMENT INDUSTRY in December, 1930, produced 8,480,000 bbl., shipped 5,688,000 bbl. from the mills, and had in stock at the end of the month 25,848,000 bbl. Production of portland cement in December, 1930, showed a decrease of 24.4% and shipments a decrease of 4.4%, as compared with December, 1929. Portland cement stocks at the mills were 9.8% higher than a year ago. The preliminary totals for 1930 show decreases of 5.7% in production and 6.5% in shipments from the final totals for 1929.

The statistics here presented are compiled from reports for December, received by the Bureau of Mines from all manufacturing plants except two, for which estimates have been included in lieu of actual returns.

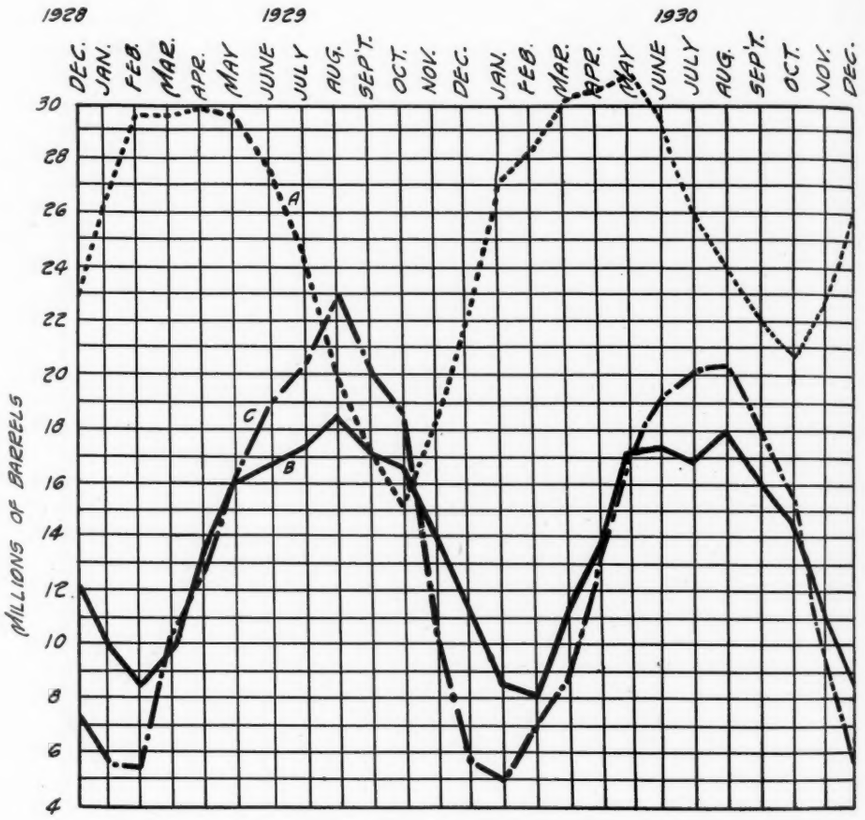
In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants both at the close of December, 1930, and of December, 1929. The estimates include increased capacity due to extensions and improvements during the period.

RELATION OF PRODUCTION TO CAPACITY

	Dec. 1929	Dec. 1930	Nov. 1930	Oct. 1930	Sept. 1930
	Pct.	Pct.	Pct.	Pct.	Pct.
The month	51.5	38.2	51.7	65.4	75.7
12 months ended	66.4	61.5	62.6	64.2	65.2

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during October and November, 1929 and 1930:



(a) Stocks of finished portland cement at factories; (b) production of finished portland cement; (c) shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN OCTOBER AND NOVEMBER, 1929 AND 1930, IN BARRELS*

Shipped to	1929—October	1930	1929—Nov.	1930
Alabama	172,980	88,358	132,035	67,219
Alaska	662	697	396	158
Arizona	52,544	33,524	43,145	31,593
Arkansas	190,656	144,307	133,371	89,411
California	1,075,308	931,721	943,641	666,196
Colorado	97,352	78,683	32,910	41,748
Connecticut	229,221	153,822	178,005	113,957
Delaware	36,005	20,017	28,275	17,889
District of Columbia	104,051	154,670	99,047	84,931
Florida	106,271	89,354	111,127	74,271
Georgia	124,215	174,340	121,871	103,952
Hawaii	22,716	23,850	26,788	17,979
Idaho	28,709	34,385	17,468	13,538
Illinois	1,406,895	1,586,016	782,779	655,302
Indiana	686,986	321,285	326,534	160,458
Iowa	716,047	317,288	127,446	98,047
Kansas	336,060	226,472	159,803	153,458
Kentucky	178,287	223,805	107,310	102,299
Louisiana	245,643	172,194	152,054	133,845
Maine	80,564	87,454	52,865	53,127
Maryland	291,625	257,617	233,983	119,436
Massachusetts	365,195	376,533	225,482	248,481
Michigan	1,161,054	867,458	588,511	407,866
Minnesota	352,958	237,592	130,411	89,720
Mississippi	99,934	39,377	71,069	34,044
Missouri	681,598	713,573	396,019	413,025
Montana	55,468	27,189	16,035	20,597
Nebraska	213,158	174,005	61,548	68,717
Nevada	15,028	18,751	8,173	6,681
New Hampshire	67,001	48,117	37,526	24,958
New Jersey	911,203	664,381	678,291	403,664
New Mexico	28,479	27,047	15,557	17,445
New York	2,295,014	2,063,858	1,441,207	1,233,534
North Carolina	147,399	101,403	110,928	63,911
North Dakota	42,474	24,513	9,564	7,734
Ohio	1,218,439	1,011,292	638,120	614,013
Oklahoma	376,193	270,430	261,283	195,644
Oregon	114,228	130,953	78,363	87,098
Pennsylvania	1,550,799	1,351,511	1,022,410	517,568
Porto Rico	5,195	5,000	3,520	125
Rhode Island	78,405	76,031	58,690	34,865
South Carolina	88,492	273,208	70,756	177,632
South Dakota	94,859	44,410	22,438	17,948
Tennessee	330,340	271,922	228,476	117,871
Texas	759,309	438,457	475,332	454,199
Utah	60,619	38,549	37,616	21,142
Vermont	109,422	53,087	43,012	21,939
Virginia	152,804	155,410	120,589	102,029
Washington	240,543	324,276	158,675	262,159
West Virginia	168,957	139,483	103,156	105,304
Wisconsin	597,697	414,797	224,480	157,633
Wyoming	28,708	20,691	9,346	8,763
Unspecified	28,000	40,039	.....	13,633
	18,621,769	15,563,202	11,157,436	8,748,765
Foreign countries	73,231	35,798	64,564	35,235
Total shipped from cement plants	18,695,000	15,599,000	11,222,000	8,784,000

*Includes estimated distribution of shipments from three plants in October and November, 1929; from two plants in October and November, 1930.

SUMMARY OF MONTHLY ESTIMATES OF PRODUCTION AND SHIPMENTS OF FINISHED PORTLAND CEMENT IN 1930, BY DISTRICTS

(In thousands of barrels)
(Revised January 13, 1931)

District	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1930	1929
Production														
Eastern Pennsylvania, New Jersey, Maryland	2,286	2,033	2,717	3,067	3,707	3,397	3,566	3,676	3,273	2,793	2,390	1,939	34,844	37,727
New York and Maine	320	187	618	999	1,176	1,271	1,249	1,396	1,238	1,220	924	716	11,314	11,419
Ohio, Western Pennsylvania, West Virginia	727	762	1,205	1,458	2,112	1,924	1,973	2,009	1,873	1,655	1,085	769	17,552	17,936
Michigan	346	543	383	562	1,419	1,487	1,410	1,426	1,242	1,130	943	614	11,505	13,749
Wisconsin, Illinois, Indiana and Kentucky	1,377	883	1,129	1,366	2,143	2,336	2,255	2,409	2,171	1,938	1,233	984	20,224	21,378
Virginia, Tenn., Alabama, Ga., Fla., La.	842	727	1,099	1,262	1,306	1,316	1,213	1,232	1,198	1,132	877	680	12,884	13,793
Eastern Missouri, Iowa, Minnesota, So. Dak.	758	748	971	1,415	1,763	1,987	1,832	1,933	1,748	1,591	1,131	906	16,783	15,697
Western Missouri, Neb., Kan., Okla., Ark.	701	709	945	1,160	1,360	1,322	1,405	1,361	1,233	957	743	700	12,596	12,393
Texas	321	482	694	757	630	558	585	697	679	484	502	392	6,781	7,374
Colorado, Montana, Utah, Wyoming, Idaho	0	130	240	286	314	300	217	302	260	134	40	34	2,257	2,695
California	718	755	873	838	926	955	1,009	922	806	953	817	531	10,103	13,092
Oregon and Washington	102	203	351	351	393	386	364	458	403	423	413	215	4,062	3,393
	8,498	8,162	11,225	13,521	17,249	17,239	17,078	17,821	16,124	14,410	11,098	8,480	160,905	170,646
Shipments														
Eastern Pennsylvania, New Jersey, Maryland	1,388	1,419	2,311	3,127	3,746	3,903	4,085	4,161	3,813	3,535	2,124	1,469	35,081	37,647
New York and Maine	249	257	472	839	1,191	1,381	1,524	1,560	1,467	1,201	617	364	11,122	11,520
Ohio, Western Pennsylvania, West Virginia	472	651	724	1,375	1,974	2,119	2,358	2,338	1,984	1,704	830	467	16,996	17,737
Michigan	234	297	411	702	1,229	1,459	1,604	1,627	1,381	1,093	538	245	10,820	13,326
Wisconsin, Illinois, Indiana and Kentucky	327	664	696	1,265	2,026	2,552	2,916	3,045	2,716	2,115	857	394	19,573	21,171
Virginia, Tenn., Alabama, Ga., Fla., La.	730	881	970	1,239	1,192	1,180	1,327	1,328	1,178	1,248	807	648	12,728	14,047
Eastern Missouri, Iowa, Minnesota, So. Dak.	214	492	502	1,230	2,184	2,412	2,540	2,491	2,116	1,618	739	337	16,875	15,984
Western Missouri, Neb., Kan., Okla., Ark.	271	764	838	1,264	1,390	1,404	1,442	1,412	1,227	947	632	367	11,958	12,267
Texas	317	521	627	776	620	706	709	634	599	469	453	362	6,793	7,084
Colorado, Montana, Utah, Wyoming, Idaho	42	104	163	262	290	296	276	292	258	227	118	46	2,374	2,766
California	640	793	816	921	980	951	946	961	905	1,006	728	755	10,402	12,965
Oregon and Washington	71	169	296	340	402	418	426	450	439	436	341	234	4,022	3,354
	4,955	7,012	8,826	13,340	17,224	18,781	20,153	20,299	18,083	15,599	8,784	5,688	158,744	169,868

SUMMARY OF ESTIMATES OF STOCKS OF FINISHED PORTLAND CEMENT AT END OF EACH MONTH IN 1930, BY DISTRICTS

(In thousands of barrels)
(Revised January 13, 1931)

District	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Eastern Pennsylvania, New Jersey and Maryland	6,075	6,689	7,095	7,037	6,998	6,513	5,992	5,509	4,966	4,255	4,521	4,991
New York and Maine	1,615	1,556	1,702	1,862	1,847	1,737	1,462	1,298	1,069	1,088	1,395	1,748
Ohio, Western Pennsylvania and West Virginia	3,289	3,401	3,882	3,965	4,102	3,908	3,523	3,190	3,079	3,030	3,285	3,587
Michigan	2,509	2,761	2,734	2,595	2,785	2,812	2,618	2,418	2,279	2,317	2,722	3,091
Wisconsin, Illinois, Indiana and Kentucky	3,926	4,145	4,578	4,691	4,808	4,591	3,931	3,295	2,751	2,546	2,922	3,512
Virginia, Tennessee, Alabama, Georgia, Florida and Louisiana	1,753	1,598	1,728	1,751	1,865	2,001	1,889	1,794	1,814	1,697	1,767	1,799
Eastern Missouri, Iowa, Minnesota and South Dakota	3,140	3,396	3,864	4,049	3,628	3,203	2,495	1,937	1,569	1,542	1,934	2,503
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas	1,889	1,834	1,941	1,837	1,807	1,725	1,688	1,637	1,643	1,652	1,763	2,095
Texas	817	778	845	825	836	688	564	627	707	721	769	799
Colorado, Montana, Utah, Wyoming and Idaho	415	441	518	540	563	562	501	509	508	414	335	323
California	1,168	1,131	1,187	1,130	1,077	1,080	1,144	1,105	1,020	963	1,100	876
Oregon and Washington	485	519	574	585	575	544	482	505	484	472	543	524
	27,081	28,249	30,648	30,867	30,891	29,364	26,289	23,824	21,889	20,697	23,056	25,848

SUMMARY OF MONTHLY ESTIMATES OF CLINKER (UNGROUND PORTLAND CEMENT) PRODUCED AND IN STOCK AT MILLS IN THE UNITED STATES IN 1930, BY DISTRICTS

(In thousands of barrels)
(Revised January 13, 1931)

District	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1930	1929
Production														
Eastern Pennsylvania, New Jersey, Maryland	2,546	2,415	3,120	3,264	3,543	3,270	3,211	3,273	2,919	2,470	2,235	2,052	34,318	37,299
New York and Maine	525	344	627	1,081	1,067	1,123	1,124	1,136	1,180	1,183	1,030	853	11,273	11,049
Ohio, Western Pennsylvania, West Virginia	999	1,041	1,341	1,640	1,988	1,854	1,667	1,511	1,622	1,525	1,263	992	17,443	17,692
Michigan	868	758	716	907	1,204	1,241	1,138	1,092	1,006	1,141	917	690	11,678	13,578
Wisconsin, Illinois, Indiana and Kentucky	1,586	1,539	1,626	1,829	2,197	2,099	1,854	1,858	1,665	1,706	1,337	1,109	20,405	21,547
Virginia, Tenn., Alabama, Ga., Fla., La.	901	758	1,195	1,335	1,403	1,222	1,152	1,220	1,197	1,088	972	745	13,188	13,554
Eastern Missouri, Iowa, Minnesota, So. Dak.	790	893	1,255	1,547	1,802	1,776	1,606	1,608	1,627	1,590	1,092	950	16,536	15,646
Western Missouri, Neb., Kan., Okla., Ark.	805	796	1,031	1,199	1,272	1,282	1,330	1,279	1,194	992	885	807	12,872	12,105
Texas	400	451	656	643	596	485	550	701	653	522	498	393	6,548	7,601
Colorado, Montana, Utah, Wyoming, Idaho	11	135	207	234	313	321	241	342	291	160	29	.....	2,284	2,591
California	926	701	877	946	858	899	891	860	861	1,091	1,002	607	10,519	12,780
Oregon and Washington	147	177	394	400	364	323	305	364	362	427	379	322	3,964	3,546
	10,504	10,008	13,045	15,025	16,607	15,895	15,069	15,244	14,577	13,895	11,639	9,520	161,028	168,988
Stocks (end of month)														
Eastern Pennsylvania, New Jersey, Maryland	1,356	1,785	2,223	2,461	2,340	2,259	1,962	1,610	1,292	1,025	917	1,055	.....	.....
New York and Maine	813	970	987	1,081	986	849	740	496	453	430	547	694	.....	.....
Ohio, Western Pennsylvania, West Virginia	1,212	1,496	1,643	1,845	1,749	1,705	1,432	972	752	648	834	1,064	.....	.....
Michigan	1,152	1,371	1,705	2,053	1,847	1,613	1,351	1,027	800	819	793	871	.....	.....
Wisconsin, Illinois, Indiana and Kentucky	858	1,511	2,011	2,482	2,544	2,316	1,922	1,380	878	649	755	887	.....	.....
Virginia, Tenn., Alabama, Ga., Fla., La.	732	770	879	964	1,074	980	928	917	925	876	964	1,028	.....	.....
Eastern Missouri, Iowa, Minnesota, So. Dak.	575	728	1,018	1,158	1,221	1,037	836	587	490	500	475	530	.....	.....
Western Missouri, Neb., Kan., Okla., Ark.	290	383	475	519	446	417	354	285	258	301	447	561	.....	.....
Texas	563	536	507	404	379	315	286	299	279	328	331	338	.....	.....
Colorado, Montana, Utah, Wyoming, Idaho	254	258	235	183	184	206	229	270	302	329	305	272	.....	.....
California	1,315	1,261	1,268	1,406	1,315	1,231	1,109	1,004	961	1,025	1,081	1,127	.....	.....
Oregon and Washington	526	503	552	608	583	524	535	428	393	336	309	420	.....	.....
	9,646	11,572	13,503	15,164	14,668	13,452	11,684	9,275	7,783	7,266	7,758	8,847	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production	1930	Stocks at end of month 1929	1930	Month	1929—Production	1930	Stocks at end of month 1929	1930
January	12,012,000	10,504,000	9,642,000	9,646,000	July	15,214,000	*15,069,000	11,619,000	11,684,000
February	11,255,000	10,008,000	12,436,000	11,572,000	August	15,829,000	15,244,000	8,995,000	9,275,000
March	12,450,000	13,045,000	14,948,000	13,503,000	September	15,165,000	14,577,000	7,009,000	7,783,000
April	14,166,000	15,025,000	15,479,000	15,164,000	October	15,515,000	13,895,000	5,934,000	7,266,000
May	15,444,000	16,607,000	14,911,000	14,668,000	November	14,087,000	*11,639,000	6,134,000	*7,758,000
June	15,312,000	15,895,000	13,587,000	13,452,000	December	12,539,000	9,520,000	7,526,000	8,847,000

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN DECEMBER, 1929 AND 1930, AND STOCKS IN NOVEMBER, 1930, IN BARRELS

District	Production 1929—Dec.—1930		Shipments 1929—Dec.—1930		Stocks at end of month 1929	1930	Stocks at end of Nov., 1930*
Eastern Penn., N. J., Md.	2,479,000	1,939,000	1,366,000	1,469,000	5,193,000	4,991,000	4,521,000
New York and Maine	731,000	716,000	294,000	364,000	1,555,000	1,748,000	1,395,000
Ohio, Western Penn., W. Va.	940,000	769,000	511,000	467,000	3,035,000	3,587,000	3,285,000
Michigan	1,008,000	614,000	246,000	245,000	2,434,000	3,091,000	2,722,000
Wis., Ill., Ind. and Ky.	1,445,000	984,000	429,000	394,000	2,943,000	3,512,000	2,922,000
Va., Tenn., Ala., Ga., Fla., La.	905,000	680,000	821,000	648,000	1,641,000	1,799,000	1,767,000
East'n Mo., Ia., Minn. S. D.	993,000	906,000	273,000	337,000	2,595,000	2,503,000	1,934,000
Western Mo., Neb., Kansas, Oklahoma and Arkansas	976,000	700,000	529,000	367,000	1,459,000	2,095,000	1,763,000
Texas	593,000	392,000	450,000	362,000	813,000	799,000	769,000
Colo., Mont., Utah, Wyo., Ida.	84,000	34,000	81,000	46,000	456,000	323,000	335,000
California	913,000	531,000	813,000	755,000	947,000	876,000	1,100,000
Oregon and Washington	148,000	215,000	138,000	234,000	467,000	524,000	543,000
	11,215,000	8,480,000	5,951,000	5,688,000	23,538,000	25,848,000	23,056,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production—1930		1929—Shipments—1930		Stocks at end of month 1929	1930
January	9,881,000	8,498,000	5,707,000	4,955,000	26,797,000	27,081,000
February	8,522,000	8,162,000	5,448,000	7,012,000	29,870,000	28,249,000
March	9,969,000	11,225,000	10,113,000	8,826,000	29,724,000	30,648,000
April	13,750,000	13,521,000	13,325,000	13,340,000	30,151,000	30,867,000
May	16,151,000	17,249,000	16,706,000	17,224,000	29,624,000	30,891,000
June	16,803,000	17,239,000	18,949,000	18,781,000	27,505,000	29,364,000
July	17,315,000	17,078,000	20,319,000	20,153,000	24,525,000	26,289,000
August	18,585,000	17,821,000	23,052,000	20,299,000	20,056,000	23,824,000
September	17,223,000	16,124,000	19,950,000	18,083,000	17,325,000	21,889,000
October	16,731,000	14,410,000	18,695,000	15,599,000	15,381,000	20,697,000
November	14,053,000	11,098,000	11,222,000	8,784,000	18,213,000	*23,056,000
December	11,215,000	8,480,000	5,951,000	5,688,000	23,538,000	25,848,000
	170,198,000	160,905,000	169,437,000	158,744,000	.....	.....

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN DECEMBER, 1929 AND 1930, IN BARRELS

District	1929—Production—1930		Stocks at end of month 1929	1930
Eastern Pennsylvania, New Jersey and Maryland	2,527,000	2,052,000	1,030,000	1,055,000
New York and Maine	895,000	853,000	605,000	694,000
Ohio, Western Pennsylvania and West Virginia	1,295,000	992,000	933,000	1,064,000
Michigan	1,129,000	690,000	625,000	871,000
Wisconsin, Illinois, Indiana and Kentucky	1,659,000	1,109,000	652,000	887,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	986,000	745,000	664,000	1,028,000
Eastern Missouri, Iowa, Minnesota and South Dakota	1,076,000	950,000	534,000	530,000
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas	967,000	807,000	182,000	561,000
Texas	686,000	393,000	474,000	338,000
Colorado, Montana, Utah, Wyoming and Idaho	56,000	.....	243,000	272,000
California	1,070,000	607,000	1,105,000	1,127,000
Oregon and Washington	193,000	322,000	479,000	420,000
	12,539,000	9,520,000	7,526,000	8,847,000

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1929 AND 1930

Month	1929—Exports—1930 Barrels	Value	Barrels	Value	1929—Imports—1930 Barrels	Value	Barrels	Value
January	78,639	$283,002	82,387	$293,135	151,302	$177,976	201,609	$207,461
February	58,886	225,590	64,267	217,798	118,930	123,123	114,455	119,717
March	69,079	235,164	117,563	357,896	131,909	112,788	43,622	59,981
April	64,145	218,316	57,419	200,217	89,668	114,281	140,871	178,226
May	57,955	219,366	57,423	198,170	200,646	267,854	94,696	111,998
June	96,055	287,612	82,077	223,639	203,545	228,170	55,356	74,370
July	71,992	247,177	47,082	166,577	182,098	199,960	12,404	20,973
August	60,013	225,762	49,031	167,579	183,938	199,403	35,323	39,029
September	86,268	308,631	46,594	153,384	112,372	152,239	51,096	59,721
October	101,359	337,839	62,690	190,305	172,566	187,504	75,284	84,364
November	53,378	198,197	50,495	151,555	96,568	95,844	109,124	125,448
December	88,403	297,255	.....	.....	84,358	79,098	.....	.....
	886,172	$3,083,911	.....	.....	1,727,900	$1,938,240	.....	.....

Exports and Imports†*

These figures were compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES, IN NOVEMBER, 1930

Exported to	Barrels	Value
Canada	3,385	$ 13,975
Central America	11,708	22,945
Cuba	4,266	11,332
Other West Indies and Bermuda	5,253	12,387
Mexico	4,318	15,458
South America	18,726	59,189
Other countries	2,839	16,269
	50,495	$151,555

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN NOVEMBER, 1930

Imported from	District into which imported	Barrels	Value
Belgium	Massachusetts	29,795	$31,640
	New York	6,312	5,867
	Porto Rico	3,021	5,600
	Total	39,128	$43,107
Canada	Maine and N. H.	140	$402
	Porto Rico	2,845	3,532
	Total	2,985	$3,934
Denmark	New York	23,857	$23,391
	Porto Rico	9,807	10,586
	Total	33,664	$33,977
France	Massachusetts	739	$1,783
Germany	Los Angeles	4,897	$9,485
Japan	Hawaii	1,430	$1,515
United K'gd'm.	New York	5,020	$9,379
	Philadelphia	21,261	22,268
	Total	26,281	$31,647
	Grand total	109,124	$125,448

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN NOVEMBER, 1930

	Barrels	Value
Alaska	207	$ 631
Hawaii	22,473	60,640
Porto Rico	1,453	3,011
	24,133	$64,282

*The value of exports of domestic cement is the actual cost at the time of exportation in the ports of the United States whence they are exported, as declared by the shippers on the export declarations.

†The value of imported cement represents the foreign market value at the time of exportation to the United States.

Average Retail Prices for Rock Products Materials, December 1, 1930

City	Portland cement, per bbl., exclu. of cont.	Gypsum wallboard, ⅜ in., per M	Hydrated lime, per ton	Building sand, per cu. yd.	Crushed stone, ¾-in., per ton	Gypsum plaster, neat, per ton
New Haven, Conn.	$2.90	.....	$20.00	$1.25	$2.25	.....
New London, Conn.	2.80	$25.00	26.00	1.50	3.00	$18.00
Waterbury, Conn.	3.00	30.00	20.00	1.35	2.45	20.00
Haverhill, Mass.	2.80	25.00	20.00	.....	.....	18.75
New Bedford, Mass.	2.60	27.00	18.50	1.75	3.00	17.50
Albany, N. Y.	2.97	24.75	18.00	.....	.....	17.10
Buffalo, N. Y.	2.95	21.00	18.00	2.50	2.05	16.00
Poughkeepsie, N. Y.	2.18	.....	.....	2.25	2.00	.....
Rochester, N. Y.	3.25	22.00	20.00	1.75	2.40	17.00
Syracuse, N. Y.	3.00	22.50	18.00	2.00	2.25	17.00
Yonkers, N. Y.	2.56	.....	17.00	2.25	3.25	.....
Paterson, N. J.	2.40	25.00	18.00	1.50	2.10	17.50
Trenton, N. J.	2.40	26.00	18.00	1.50	2.10	17.50
Philadelphia, Penn.	2.30	.....	15.00	1.80	2.65	18.00
Scranton, Penn.	2.80	.....	20.00	3.25	.....	19.00
Baltimore, Md.	2.54	.....	13.00	2.50	2.75	16.00
Washington, D. C.	2.55	25.00	14.00	.....	.....	16.00
Richmond, Va.	3.10	31.00	17.50	1.95	2.45	20.00
Fairmount, W. Va.	2.80	35.00	16.00	3.15	3.50	18.00
Columbia, S. C.	2.63	.....	13.50	2.50	2.75	14.15
Atlanta, Ga.	2.85	.....	17.50	3.38	3.25	18.00
Savannah, Ga.	2.25	25.00	20.00	1.75	.....	16.00
Tampa, Fla.	3.00	.....	24.00	2.00	4.50	18.75
Birmingham, Ala.	3.00	.....	19.00	2.85	2.25	17.00
Shreveport, La.	3.20	.....	.....	2.00	3.80	22.00
Erie, Penn.	2.40	22.50	19.00	2.25	.....	16.00
Akron, Ohio	2.67	.....	18.00	1.85	1.85	.....
Cincinnati, Ohio	$2.95	$24.75	$16.40	$2.63	$2.55	.....
Cleveland, Ohio	2.40	22.00	12.00	1.95	2.70	$14.50
Columbus, Ohio	2.70	.....	14.00	.....	2.25	15.00
Toledo, Ohio	2.60	20.00	16.00	2.00	2.50	14.50
Youngstown, Ohio	2.60	.....	15.00	3.40	2.50	15.00
Detroit, Mich.	2.60	25.00	14.80	2.23	3.00	17.60
Lansing, Mich.	2.90	.....	14.00	.....	.....	16.50
Saginaw, Mich.	2.35	25.00	18.00	2.50	3.25	17.00
Terre Haute, Ind.	2.85	28.00	18.00	1.65	3.50	20.00
Louisville, Ky.	2.52	.....	15.50	2.20	2.43	16.00
Chicago, Ill.	2.25	21.00	17.00	2.00	2.00	16.00
Rockford, Ill.	2.90	25.00	20.00	1.75	1.15	18.00
Milwaukee, Wis.	2.25	25.00	16.00	1.50	1.30	18.00
Des Moines, Iowa	3.08	.....	20.00	1.10	.....	.....
Kansas City, Mo.	2.50	25.00	24.00	1.70	1.80	15.00
St. Louis, Mo.	2.15	.....	18.00	1.35	1.00	18.00
St. Paul, Minn.	2.45	.....	18.00	2.23	1.75	18.00
Grand Forks, N. D.	2.80	25.00	.....	2.60	.....	16.00
Sioux Falls, S. D.	3.00	.....	24.00	1.25	2.25	15.00
San Antonio, Texas	2.60	.....	20.00	2.10	2.35	19.15
Tucson, Ariz.	3.37	.....	30.00	1.25	2.25	17.10
Denver, Colo.	2.20	32.00	22.00	1.25	1.50	18.00
Los Angeles, Calif.	2.30	.....	22.00	1.85	1.90	15.20
San Francisco, Calif.	2.80	.....	22.50	1.40	1.60	19.90
Seattle, Wash.	1.75	.....	22.00	1.40	.....	20.00

Dewey Cement to Build Mississippi River Terminal

WORK on the construction of the river terminal adjacent to the plant of the Dewey Portland Cement Co., at Buffalo, Iowa, will likely be undertaken some time next summer in the opinion of H. F. Tyler, vice-president and general manager of the local company. This project, contemplated for more than a year, has been held in abeyance pending the completion of the 9-ft. channel on the upper river.

"It begins to look as if the 9-ft. channel will go through, and speedily," Mr. Tyler pointed out. "Naturally it must go through before river transportation would be of much value to us. Once it is assured, however, it is probable that we would anticipate it a little by building our terminal so as to be ready when the deeper channel is ready."

The proposed docks will cost approximately $150,000 and will be of concrete, extending partly out into the river. Three railroad tracks would be built out on to the docks, with a total capacity of 150 cars. Large loading and unloading cranes will be erected.

Arrangements are being made with a large Kentucky coal mining company to use the proposed facilities from which to unload coal shipped up the river from the south destined for interior Iowa and Nebraska points, Mr. Tyler said. This would provide a lucrative form of revenue and ultimately pay for the expense of building the terminal.

Mr. Tyler stated that the company has also made arrangements with the United States Government whereby the latter might use the docks in time of war. It is regarded as a particularly strategic point in view of the proximity of the Rock Island arsenal.

For its own use the company, ideally situated to use river transportation, would find the terminal of great benefit. Its product, cement, being non-perishable, is a commodity well adapted to a river transportation program.

The Dewey Portland Cement Co. concluded the past year 1930 with 250 men on its payroll, and a record of having employed 220 continuously throughout the 12 months. During the fall and winter they completed 12 concrete houses erected near the plant for the use of workmen and their families at a total cost of $24,000.

This force is maintained the year round, and will be maintained during 1931, Mr. Tyler stated. With its immense storage facilities the company manufactures its cement in the winter time and ships it in the other two seasons.

"The year 1930 was a good one for our company, and we expect to enjoy a like period of prosperity during 1931," he said. —*Davenport* (Ia.) *Democrat.*

W. H. L. McCourtie, His Home Town's Philanthropist

AN ARTICLE in a recent issue of the *Cleveland* (Ohio) *Press,* signed by Julian Griffin, will interest the many friends of W. H. L. McCourtie among ROCK PRODUCTS readers. The story is captioned "Gives Town Riches—Cement King, Still 'Herb' to Citizens, Sets Up Modern Paradise." And this is the story:

"Forty years ago Herb McCourtie, a boy of 18, walked away from his home town of Somerset, Mich. Several years ago W. H. L. McCourtrie, multi-millionaire president of the Trinity Portland Cement Co., rode back to Somerset.

W. H. L. McCourtie
Photo by Blank-Stoller, Inc.

"Another local boy had made good. And was pleased to learn that he was still 'Herb' to the natives.

"He is planning to leave the residue of his estate—estimated far into the millions of dollars—to his home town. While in Cleveland for a meeting of Grand Circuit Race executives, he talked over arrangements with a classmate of Ann Arbor days, A. D. Messick, vice-president of the Union Trust Co.

"Ever a dreamer, McCourtie visualizes Somerset as a township where the trustees will collect his income and spend it for churches, schools, hospitals, pavements, etc., without the burden of taxation. There will be no hospital bills. No citizen ever will want for the necessities of life.

"McCourtie's plan grew out of a desire to improve the conditions around the old farmhouse where he was born. He dug out an old spring and expanded it into a fishpond. His son was instructed to remodel the homestead, which he did to palatial proportions.

"A huge underground garage was erected on the sloping terrace. It was transformed into a clubhouse, with an elaborate kitchen, cardrooms, bar and everything to be desired.

"This completed, he looked around and noticed that the village had grown a bit seedy. He called a meeting of the 150 residents and told them what he thought, ending by offering free paint every year to those who would clean up. The village now is spick and span.

"He went a step further in his dreams and erected a new church and created a trust fund to provide for the minister. He furnished electric lights and waterworks for the village.

"A portly, ruddy-faced gentleman of 58, he is very sentimental. Tears came to his eyes as he recalled touching tributes paid to him by townspeople who still call him 'Herb.'

"He wears high-top button shoes and large diamonds in his ring and stickpin. His parents and sisters are all dead. He lives for Somerset.

"His old home will be a community house. His park will be a public playground, in addition to a 1200-acre game preserve including two lakes.

"It will be fixed so that outsiders may not crowd in to share the benefits with the residents. One must live there ten years to be eligible to share the privileges of what, in effect, will be an elaborate club, without dues."

Florida Cement Takes Out Group Insurance Policy

THE Florida Portland Cement Co., Tampa, Fla., has taken another step toward the completion of its employes' group insurance program through the recent installation of more than $109,000 accidental death and dismemberment insurance in combination with sick and accident benefits. The additional coverage is being underwritten by the Metropolitan Life Insurance Co.

In the main bloc of participating employes, individual benefits are based on salary, the accidental death and dismemberment insurance amounting to either $1,000 or $2,000 while the sick and accident benefits range from $5 to $40 a week. These weekly payments will be made when an employe is unable to work due to sickness from any cause, or injury received while off duty.

Besides creating an accidental death benefit, the dismemberment insurance will be paid in full to an employe suffering the accidental loss of any two members. One-half this amount will be paid for the accidental loss of one member.

When sick or injured and under the care of a physician, insured employes are offered the advantages of a visiting nurse service.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Dec. 27	Jan. 3	Dec. 27	Jan. 3
Eastern	637	898	942	910
Allegheny	820	1,131	1,157	1,038
Pocahontas	49	21	208	224
Southern	236	429	2,930	4,502
Northwestern	320	232	655	639
Central Western	450	359	2,582	2,927
Southwestern	152	36	2,493	2,529
Total	2,664	3,106	10,967	12,769

COMPARATIVE TOTAL LOADINGS FOR THE FULL YEAR, BY DISTRICTS, 1929 AND 1930

	Limestone Flux		Sand, Stone and Gravel	
	1929	1930	1929	1930
Eastern	165,149	137,267	552,840	392,807
Allegheny	178,313	130,435	366,373	304,593
Pocahontas	18,871	21,484	50,293	62,459
Southern	31,177	30,830	440,471	412,280
Northwestern	55,114	49,183	304,142	260,639
Central Western	26,971	24,864	531,140	472,223
Southwestern	25,617	22,445	348,316	317,094
Total	501,212	416,508	2,593,575	2,222,095

COMPARATIVE TOTAL LOADINGS FOR THE FULL YEAR, 1929 AND 1930

	1929	1930
Limestone flux	*501,212*	*416,508*
Sand, stone, gravel	*2,593,575*	*2,222,095*

COMPARATIVE TOTAL LOADINGS, 1930 AND 1931

	1930	1931
Limestone flux	*5,086*	*3,106*
Sand, stone, gravel	*19,184*	*12,769*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of January 24:

SOUTHERN FREIGHT ASSOCIATION DOCKET

53285. **Stone, crushed** (except bituminous rock or bituminous asphalt rock), carloads, Watauga, Tenn., to N. & W. Ry. stations. It is proposed to establish rates on crushed stone (except bituminous rock or bituminous asphalt rock), carloads (See Note 3), from Watauga, Tenn., to N. & W. Ry. stations based on I. C. C. Docket 15216 (Buckland) joint line scale for distances via Southern Ry., to Bristol, thence N. & W. Ry. Statement of the proposed rates will be furnished upon request.

53297. **Stone, crushed,** Fishersville, Va., to points in Carolina territory. It is proposed to establish rates on **chert, gravel, sand, slag and stone** from Fishersville, Va., to stations on the A. C. L. R. R., S. A. L. Ry. and short line connections in Virginia, North Carolina and South Carolina east of the Wadesboro, N. C., Cheraw, S. C., Florence, S. C., line and stations on the Southern Railway in North Carolina and South Carolina south of Lynchburg, Richmond and Norfolk, Va., and east of line drawn from Newton, N. C., to Columbia, S. C., adjusted with relation to those presently in effect from Rocky Point, Indian Rock and Eagle Mountain, Va., and other Virginia stone producing points named in Agent Cottrell's I. C. C. 781.

53301. **Sand and gravel** between points in Virginia. It is proposed to publish following restriction against the application of mileage scales in Section 2, as amended, of Agent Glenn's Freight Tariff 88-A, I. C. C. A-655, on interstate traffic between points in Virginia: "Applicable only when distances are computed via interstate routes." The above restriction is to be published by placing a reference mark against "Virginia," which reference mark is to be explained in line with the foregoing.

53407. **Feldspar,** from Erwin, Tenn., and points in North Carolina to Jackson, Miss. At present, lowest combination applies. It is proposed to establish commodity rates on feldspar, carloads, minimum weight 50,000 lb., to Jackson, Miss.: From Erwin, Tenn., 463c; Toecane, Minpro and Spruce Pine, N. C., 475c; Cane Branch, N. C., and Bowditch, N. C., 499c per net ton.

53408. **Feldspar,** from Erwin, Tenn., and points in North Carolina to Birmingham, N. J. At present class rates apply. It is proposed to establish rates on feldspar, carloads, from Clinchfield and Black Mountain Ry. stations to Birmingham, N. J.: From Erwin, Tenn., Minpro, Spruce Pine and Toecane, N. C., 581c; Bowditch and Cane Branch, N. C., 617c per net ton. Same as in effect to Vineland, N. J.

53422. **Crushed stone,** from Siam, Tenn., to N. & W. Ry. stations. Present rates, lowest combination. Proposed rate on crushed stone (except bituminous rock or bituminous asphalt rock), carloads (See Note 3), from Siam, Tenn., to N. & W. Ry. stations, Radford Division, Bristol District and Abingdon Branch, based on I. C. C. Docket 15216 (Buckland) joint line scale. Statement of the proposed rates will be furnished upon request.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

53423. **Sand and gravel,** from Elizabethton, Tenn., to N. & W. Ry. stations. Present rate, lowest combination. Proposed rate on sand and gravel, carloads (See Note 3), from Elizabethton, Tenn., to N. & W. Ry. stations, Radford Division, Bristol District and Abingdon Branch, based on I. C. C. Docket 15216 (Buckland) joint line scale. Statement of the proposed rates will be furnished upon request.

53424. **Soapstone and talc,** from Birmingham, Ala., to Pittsburgh, Penn., Sayre, Penn., Rochester, N. Y., and Toledo, O. Present rate, combination. Proposed rates on soapstone and talc, straight or mixed carloads, minimum weight 50,000 lb., from Birmingham, Ala., to Pittsburgh, Penn., 690c; Sayre, Penn., and Rochester, N. Y., 866c, and Toledo, O., 650c per net ton, same as in effect from Cartersville, Ga., except to Sayre, Penn., which is made the same as from Cartersville, Ga., to Syracuse, N. Y.

53425. **Soapstone and talc,** from Birmingham, Ala., to Chicago, Ill. Present rate, combination. Proposed rate on soapstone and talc, straight or mixed carloads, minimum weight 50,000 lb., from Birmingham, Ala., to Chicago, Ill., 600c per net ton, made in line with rates from other producing points in the South.

53434. **Feldspar,** from Erwin, Tenn., Minpro, Spruce Pine, Toecane, Bowditch and Cane Branch, N. C., to Momence, Peoria and Streator, Ill. It is proposed to establish rates on feldspar, carloads, minimum weight 50,000 lb., to Momence, Peoria and Streator, Ill.: From Erwin, Tenn., 657c; Minpro, Spruce Pine and Toecane, 669c; Bowditch and Cane Branch, N. C., 693c per net ton, same as currently in effect to Chicago, Ill.

53446. **Mica, dry ground, and mica schist,** from Chicago, Ill., to New Orleans, La., and Atlanta, Ga. Present rates, fifth class. Proposed rates on mica, dry ground, and mica schist, in straight or mixed carloads, minimum weight 60,000 lb., from Chicago, Ill., to New Orleans, La., 32½c; Atlanta, Ga., 35½c per 100 lb.

53454. **Phosphate rock,** from Florida mines to Pensacola, Fla. Present rate, $3.49 per ton of 2240 lb. Proposed rate on crude phosphate rock, carloads, from Florida mines named in A. C. L. R. R. I. C. C. No. B-2536 and S. A. L. Ry. I. C. C. A-7315 to Pensacola, Fla., $3 per ton of 2240 lb. Compares favorably with rate from Mount Pleasant, Tenn.

53458. **Feldspar,** from Clinchfield R. R. and Black Mountain Ry. stations to Lansdale and Hatboro, Penn. Present rate, $5.40 per net ton, except from Bowditch and Cane Branch, N. C., $5.76 per net ton. Proposed rate on feldspar, carloads, minimum weight 50,000 lb., to Hatboro and Lansdale, Penn., from producing points on the Clinchfield R. R., $5 per net ton; Black Mountain Ry., $5.36 per net ton; same as in effect to Trenton, N. J.

53498. **Stone, agricultural (ground or pulverized limestone),** from Greely, Ky., to L. & N. R. R. stations in Kentucky and Tennessee. It is proposed to establish rate on stone, agricultural (ground or pulverized limestone), carloads, minimum weight 60,000 lb., from Greely, Ky., to points on the L. & N. R. R. in Tennessee and Kentucky in line with competing points such as Russellville, Ky., Newsom and Mimms, Tenn. Statement of the proposed rates will be furnished upon request.

53539. **Sand and gravel,** from Warmore, Va., to Southern Ry. stations in Virginia. It is proposed to establish, for intrastate application, rates on sand and gravel, carloads (See Note 3), from Warmore, Va., to stations on the Norfolk division of the Southern Ry., viz.: Nelson to Boydton, inclusive, 125c; Baskerville, Union Level and La Crosse, 115c; Brodnax to Lawrenceville, inclusive, 105c; Edgerton to Cook and Alcott to Drewryville, inclusive, 95c; Capron to Franklin, inclusive, 105c; Lees Mill to Manning, inclusive, 115c; Soroco to West Norfolk, inclusive, and Silverthorn to Alexanders, inclusive, 125c per net ton.

SOUTHWESTERN FREIGHT BUREAU DOCKET

21904. **Asphalt rock, crushed,** from Dougherty, Okla., to points in Texas. To publish on crushed asphalt rock, carloads (See Note 1), except when car is loaded to full visible capacity actual weight will govern, from Dougherty, Okla., to points on the P. & S. F. Ry., rates as shown below for representative points, and to points on the G. C. & S. F. Ry., Temple, Tex., and north, also Temple, Tex., and west, single line rates shown in Item No. 2763, T. L. T. 2K, and to points on connecting lines of the G. C. & S. F. Ry. interchanging at junctions north of Temple, Tex., lines which desire to participate in the rates, joint line rates shown in Item No. 2763, T. L. T. 2K. Rates in cents per ton of 2,000 lb.

FROM DOUGHERTY, OKLA.

To—	Rate
Shattuck, Okla., and various	197
Follett, Tex., and various	217
Farnsworth, Tex., and various	237
Panhandle, Tex., and various	237
Folsom, Tex., and various	257
Amarillo, Tex., and various	297
Sudan, Tex., and various	317
Cleta, Tex., and various	299
Dugger, Tex., and various	281
Snyder, Tex., and various	263
Ranchland, Tex., and various	220
Idalou, Tex., and various	299

Shippers of asphalt rock located at Dougherty, Okla., are at a disadvantage because of rates enjoyed to the territory involved by shippers in the Uvalde, Tex., district. Rates proposed are practically the same for similar distances as from points in the Uvalde district. A slight deviation from the Texas intrastate scale has been found necessary at a few points on the P. & S. F. Ry.

21908. **Plasterboard,** from Memphis, Tenn., New Orleans, etc., to Utah common points. To establish a rate of 80c per 100 lb. on plasterboard, etc., description and minimum weight as per Item 5750B, W. T. L. Tariff 120D, and Item 3575, W. T. L. Tariff 124G, from Memphis, Tenn., New Orleans and Shreveport, La., and points grouped therewith, as per the above named tariffs to Utah common points. The Interstate Commerce Commission in I. C. C. Docket 17006 authorized carriers to establish rates on fibreboard from Lockport, N. Y., to points in Western Classification territory (west of Western Trunk Line territory) that would not exceed the plasterboard rates from Ft. Dodge, Ia., Southard, Okla., and Sweetwater, Tex., by a greater percentage than the 5th class rates from Lockport exceed the class C rates from the plasterboard producing points in Iowa, Oklahoma and Texas.

Under the record made, rates were checked in on the basis of this formula and the higher rate resulting at any intermediate point was held as the minimum rate to and from points beyond. The

present rate of 80½c was checked in from Sweetwater, Tex., to Granite Canyon, Wyo., and was held as a minimum from points beyond Sweetwater and from points beyond Granite Canyon to and including the Pacific coast terminals. This rate was incorrectly computed as the proper rate to apply is 80c per 100 lb., using as factors 5th class rate of $1.42 from Lockport, class C rate of $1.08 from Sweetwater, producing a percentage relationship of 76.1%, which when applied to the Lockport commodity rate of $1.05 results in a rate of 80c. The proponent has requested the Trans-Continental Freight Bureau to publish the 80c rate to points in Trans-Continental territory.

21914. **Plaster and plasterboard,** from Blue Rapids and Irving, Kan., Centreville, Fort Dodge and Gypsum, Ia., to Memphis, Tenn. To amend Item 2410B, W. T. L. Tariff 167E, applying on plaster and plasterboard, etc., as described therein, by providing that the 18½c rate as published therein be made applicable only on traffic destined Southeastern and Carolina territories. At the present time this rate is restricted to apply only on traffic destined beyond Memphis, Tenn. To certain points in Mississippi Valley territory the use of this rate together with factors beyond Memphis, Tenn., makes a lower rate than the published through rate.

21930. **Sand,** from Browntown, Wis., to Houston, Tex. To establish a rate on sand, carloads, from Browntown, Wis., to Houston, Tex., based 1½c in excess of current rate from Ottawa, Ill. Shippers state that there does not seem to be any justification for maintaining any higher rates from Browntown, Wis., than from Ottawa, Ill., on this traffic, particularly in view of the fact that both points are provided with the same class E differential over St. Louis, as per Item 1090 of Agent Johanson's Tariff 2M.

21960. **Crushed stone,** from Carthage, Mo., to points in Oklahoma and Kansas. To establish a rate of 7c per 100 lb. on stone, crushed, broken or ground, and ground limestone, carloads (See Note 1), but not less than 60,000 lb., except when car is loaded to full visible capacity, in which event actual weight will govern, from Carthage, Mo., to St. L.-S. F. Ry. stations in Oklahoma and Kansas formerly located on the M. M. B. R. R. The rates proposed, it is stated, are the same as now applicable to Vinita, Okla., for a longer haul than that necessary to the points involved. For instance, Carthage to Vinita, 73.3 miles; Carthage to Naylor, Kan., 45.2 miles.

21961. **Lime,** from points in Missouri to points in Oklahoma and Kansas. To establish a rate of 26½c per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Brickeys, Byers, Ste. Genevieve and Mosher, Mo., to St. L.-S. F. Ry. stations, Century, Okla., to Naylor, Kan., inclusive. The rates proposed are based the same difference over rates from Springfield, Mo., as currently in effect to adjacent points such as Quapaw, Miami and Afton, Okla.

21974. **Cement,** from Brookport and Cairo, Ill., to points in Arkansas and Missouri. To establish the I. C. C. Docket 8182 Scale 3 rates on cement, hydraulic, natural or portland, straight or mixed carloads, minimum weight 50,000 lb., except when marked capacity of car is less, actual weight but not less than 40,000 lb. will apply, from Brookport and Cairo, Ill., to points in Arkansas and Missouri (south of the Missouri river). Interested shippers advise they are figuring on shipping cement to Brookport and Cairo via water, there store it, and reship therefrom via rail. At present rates are published on this basis from Kosmosdale, Ky., Marquette, Mo., and Alabama producing points to Arkansas in S. W. L. Tariff 168A and were recently authorized to Missouri points south of Missouri river, also eastern Kansas.

A-443. **Basic slag,** from, to and between points in the Southwest. To amend S. W. L. Tariff 151 and 154-A and related tariffs by establishing the Column 12 basis of rates on basic slag, ground, not pulverized, carloads, minimum weight 80,000 lb., for application from, to and between points in the Southwest and Kansas-Missouri territory. Interested shipper requests the above change, stating that due to the low value of the commodity it is impossible for him to move his product to points in the Southwest under the present rate adjustment.

21994. **Crushed stone,** from St. Louis, Mo. (originating beyond), to Garden City, Mo. To establish on stone, crushed (broken stone ranging in size up to 200 lb. in weight), carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb. marked capacity will govern, from St. Louis, Mo. (on traffic originating interstate points beyond St. Louis, Mo.), to Garden City, Mo.

The proposed rate is based on the 9702 scale (single line) for distance of 364.6 miles, St. Louis, Mo., to Garden City, Mo. This basis is now published from St. Louis, Mo., to other points on the Frisco in Missouri, per St. L.-S. F. Tariff 4948B, and the above merely involves extension of the basis to include Garden City, Mo.

21996. **Cement bags,** from Memphis, Tenn., to St. Louis, Mo. To establish on cement bags, empty returned, minimum weight 24,000 lb., from Memphis, Tenn., to St. Louis, Mo., a carload rate of 27c and less than carload rate of 42½c per 100 lb. St. L.-S. F. Ry. Tariff 4191E provides for rate of 22½c on empty cement bags returned, carload minimum weight 24,000 lb., from Memphis, Tenn., to Cape Girardeau and Marquette, Mo., and 35c on less than carload shipments. The less than carload rate is approximately 250% and the carload rate approximately 160% of the cement rate in the reverse direction. Shippers feel they are entitled to the same consideration of rates on empty cement bags returned from Memphis, Tenn., to St. Louis, Mo.

21999. **Glass sand,** from Klondike, Mo., to Quinton, Okla. To establish a rate of 13½c per 100 lb. on glass sand, carloads (See Note 2), from Klondike, Mo., to Quinton, Okla. It is stated that the proposed Class E rate is too high to move the traffic, and as there will be a need for glass sand at Quinton, Okla., it is felt that shippers are entitled to rate of 13½c which is in effect to contiguous points such as Checotah and Henryetta, Okla., under Item 7182D of S. W. L. Tariff 15N.

22001. **Silica, glass sand,** from Illinois points to Quinton, Okla. To establish rate of 22½c per 100 lb. on silica glass sand, carloads (See Note 2), from Millington, Ottawa, Wedron, Utica and Oregon, Ill., to Quinton, Okla. Proposed rate is in effect from points involved to Castle, Checotah, Dewar and Sand Springs, Okla., and various other Oklahoma destinations under Item No. 7170A of S. W. L. Tariff No. 15N, some of these points being contiguous to Quinton. For example, to Castle, Okla., which is a local point on the Ft. S. & W. Ry. the same as Quinton, Okla., the short line distance from Oregon, Ill., is 762 miles as compared with distance of 753 miles to Quinton, Okla.

TRUNK LINE ASSOCIATION DOCKET

25475. **Limestone, viz., crude, fluxing, foundry and furnace,** when shipped in open-top equipment, carloads (See Note 2), from Stephens City, Va., to Monessen, Penn., $1.40 per gross ton. Reason—Proposed rate is comparable with rate to Pittsburgh, Penn.

25482. **Lime (calcium), carbonate of, recarbonated waste** (whiting substitute), (precipitated lime), carloads, minimum weight 50,000 lb., from Luke, Md., to Ludlowville, N. Y., 21½c per 100 lb. Present rate, 30½c per 100 lb, sixth class. Reason—Proposed rate is comparable with rate from Luke, Md., to New York, N. Y.

25485. (A) **Stone, natural** (other than bituminous asphalt rock), **crushed,** carloads; (B) **stone, natural** (cther than bituminous asphalt rock), **crushed, coated with oil tar or asphaltum,** carloads (See Note 2), from South Amsterdam, N. Y., to N. Y. C. R. R. stations, Bronxville to Philmont, N. Y., inclusive: (A) Rates ranging from $1.10 to $1.55 and (B) rates ranging from $1.20 to $1.65 per net ton; and N. Y. C. R. R., Nepera Park to Tilly Foster, N. Y., inclusive: (A) Rates ranging from $1.30 to $1.55 and (B) rates ranging from $1.40 to $1.65 per net ton. Reason—Proposed rates are comparable with rates from South Bethlehem, N. Y.

25486. **Crushed stone, common sand and gravel,** other than blast, engine, foundry, glass, molding, sea or silica, carloads (See Note 2), from Alfred, N. Y., to Erie R. R. stations, Arkport, Garwoods, Portage, Warsaw, Attica, Darien Center, N. Y., and various. Rates ranging from 60c to $1 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

25487. **Crushed stone, common sand and gravel,** other than blast, engine, glass, foundry, molding, sea or silica, carloads (See Note 2), from Alfred, N. Y., to Erie R. R. stations, Tuna, Bradford, Riderville, Mt. Jewett, Ketner, Johnsonburg, Penn., and various. Rates ranging from $1 to $1.20 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

25488. **Crushed stone, common sand and gravel,** other than blast, engine, glass, foundry, molding, sea or silica, carloads (See Note 2), from Alfred, N. Y., to Erie R. R. stations, Seeley Creek, Millerton, Tioga, Canoe Camp, Morris Run, Morris, Hoyvalle, Penn., and various. Rates ranging from $1 to $1.30 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

25294 (Sup. 1). **Fire stone,** carloads, minimum weight 36,000 lb., from Laverock, Penn., and Spring Mill, Penn., to Trenton, N. S., 50c per 100 lb.

25493. **Sand,** carloads, other than blast, foundry, engine, etc., **and gravel,** carloads, N.O.I.B.N., in open cars (See Note 2), from Palmerton, Penn., to Bethlehem, Penn., 90c per net ton. (Present rate $1 per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

25499. **Feldspar,** carloads (See Note 2), from Bedford Hills, N. Y., to Rochester, N. Y., 20½c per 100 lb. (Present rate 22½c per 100 lb.) Reason—Proposed rate is fairly comparable with rates from New York, N. Y., to Rochester and Buffalo, N. Y.

25509. **Crushed stone,** carloads (See Note 2), from Bloomingdale, N. J., to Warbasse, N. J., 80c per net ton. (Present rate 92c per net ton.) Reason—To meet motor truck competition.

25537. **Coke oven slag,** carloads (See Note 2), from Cascade, W. Va., to all stations on the B. & O. R. R. in the state of West Virginia. Proposed rates ranging from 130 miles and over 120 miles, $1.70 per net ton, to scale of rates ranging from 300 miles and over 290 miles, $2.50 per net ton.

25538. **Limestone, ground, unburned,** carloads, minimum weight 50,000 lb., from Montrose, N. Y., to points in Massachusetts. Proposed rates per ton of 2000 lb.

To	Prop.	To	Prop.
State Line	$2.77	Palmer	3.28
North Adams	3.15	Winchendon	3.28
Chester	3.28	Worcester	3.28
Westfield	3.28	Milford	3.28
Athol	3.28		

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

25259, Sup. 2. **Sand, glass, engine, molding, and ground flint, quartz and silex,** carloads, in straight or mixed carloads (See Note 2), from Saxton, Tatesville and Everett, Penn., to Peterboro, Belleville, Kingston, Port Hope, Ont., $5.60, and Oshawa, Ont., $5.10 per net ton.

25543. To cancel commodity rates on **cement,** carloads, from Alsen, Kingston, Rosendale, West Camp and Whiteport, N. Y., to destinations in Southern Freight Association territory as shown in Items 3175 to 3182, inclusive, of Agent Curlett's Tariff I. C. C. A265, representative points being Birmingham, Ala., Tuscaloosa, Ala., Chattanooga and Knoxville, Tenn. Reason—Investigation develops there has been no movement for some time, nor are there prospects for future shipments; therefore rates are obsolete.

25549. **Limestone, viz., crude, fluxing, foundry and furnace,** when shipped in open-top equipment, carloads (See Note 2), from Stephens City, Va., to Struthers, O., $1.90 per gross ton. (Present rate, 33½c per 100 lb.) Reason—Proposed rate is comparable with rates on like commodities from and to points in the same general territory.

25552. **Sand and gravel, other than blast, engine, foundry, glass, molding and silica,** carloads (See Note 2), from Alfred, N. Y., to stations on the Genesee and Wyoming R. R., $1.40 per net ton. (Present rate, $1.50 per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

25555. **Run of quarry stone, rip rap and quarry refuse,** carloads, in lots of 25 cars or more, minimum weight 60,000 lb., from Rochester, N. Y., to Oswego, N. Y., 50c per net ton. (Present rate, 15½c per 100 lb., sixth class.) Reason—Proposed rate compares favorably with recommended rate from Watertown, Chaumont, etc.

25559. To cancel commodity rates on **sand** (other than blast, engine, foundry, glass, molding or silica), carloads, **and stone, natural** (other than bituminous asphalt rock), **crushed or ground,** N. O. I. B. N., in open cars, carloads (See Note 2), Oaks Corners, N. Y., to Pine Valley, Millport, Montour Falls and *Watkins Glen, N. Y. Sixth class rates to apply. Reason—Investigation develops no prospective traffic to move on present rates, therefore same are obsolete.

*Applies only on crushed stone.

25561. **Cement,** carloads, to stations on the Pennsylvania and Atlantic R. R., Sharon, N. J., to Pemberton, N. J., inclusive, from Binnewater 17c, and from Brixment, N. Y., 24½c per 100 lb. Reason—Proposed rate is fairly comparable with rates to Hightstown, N. J.

25398, Sup. 1. (A) **Building lime,** carloads; (B) **agricultural and land lime,** carloads; (C) **chemio gas and glass lime,** and (D) **ground limestone,** carloads, minimum weight 30,000 lb., except on ground limestone, 50,000 lb., from the B. & O. R. R. Frederick-Martinsburg-Strasburg groups, to Carolina, W. V., (A) 17c, (B) 15c, (C) 16½c, and (D) 13c per 100 lb.

25577. To revise the rates on **cement,** carloads, from Portland Point, N. Y., Newcastle, Penn., Neville Island, Penn., Bessemer, West Winfield, Walford and Wampum, Penn., to Rutland R. R. stations, Ogdensburg, N. Y., to Rouses Point, N. Y., inclusive (Ogdensburg Division), from Portland Point, N. Y., rates ranging from 15½c to 18c per 100 lb.; from Newcastle, Penn., rates ranging from 21c to 23c per 100 lb.; from Neville Island, rates ranging from 22c to 24c per 100 lb.; from Bessemer, rates ranging from 22c to 24½c per 100 lb.; from West Winfield, rates ranging from 22c to 24½c per 100 lb.; from Walford and Wampum, Penn., rates ranging from 21½c to 23c per 100 lb. Rates to Rouses Point, Rutland R. R. delivery, are also to be publshed to Rouses Point, N. Y., for D. & H. R. R. delivery. Reason—The proposed revision to Rutland R. R. and Rouses Point, N. Y., necessitates following alignment to D. & H. stations, Beekmantown, N. Y., West Chazy, Chazy and Cooperville, N. Y., to eliminate fourth section violations from Newcastle, Walford and Wampum, Penn., 23c; from Neville Island, 24c, and from Bessemer and West Winfield, Penn., 24½c.

25582. To cancel rates now provided for in P. R. R. tariff I. C. C. 204 applying on **lime and** limestone to stations on the G. & O. Branch of

N. Y. C., Hailesboro to Edwards, N. Y., for the reason rates to this branch were inadvertently published in Supplement 12 to G. O. I. C. C. 13757. Classification basis to apply.

25583. **Lime** (for mixed carloads with plaster and plaster board, see footnote), carloads.

Footnote: Mixed carloads of lime, plaster and articles taking same rates, and plaster board, will be charged at actual weight and at the applicable carload rate for each of the respective commodities in straight carloads, subject to minimum weight of 40,000 lb. for each mixed carload, deficit in the minimum weight, if any, to be paid for at the rate on plaster, carloads, minimum weight 40,000 lb., from Akron, Oakfield, Wheatville, Clarence Centre, Transit and Batavia, N. Y., to Bangor & Aroostook R. R. and C. P. Ry. stations, Searsport, Millinocket, East Dover, Shirley, Eagle Lake, St. John, Greenville, Vanceboro, Caribou, Presque Isle, Me., and various. Rates ranging from 30c to 46½c per 100 lb. Reason—Proposed rates are comparable with rates on plaster and plaster articles from and to same points.

25587. **Limestone, unburnt, ground**, carloads, minimum weight 50,000 lb., from Carmine, Va., to Boston, Mass., and points taking same rates or basing thereon, $4.90 per net ton. Reason—Proposed rate is comparable with basis of rate from Cleveland, O., to Boston, Mass.

25592. **Sand and gravel**, carloads (See Note 2), from Pinewald, Quail Run and Toms River, N. J., to Morris, Fish House, $1.35, and to Rocky Hill and Princeton, N. J., $1.55 per net ton. Present rates, sixth class. Reason—Proposed rates are comparable with rates from Pinewald to Perth Amboy and Newark, N. J.

25623. (A) **Building lime**, carloads; (B) **agricultural and land lime**, carloads; (C) **chemical, gas or glass lime**, carloads, minimum weight 30,000 lb., from Bellefonte and Pleasant Gap, Penn., to Norristown (DeKalb St.), Penn., (A) 11½c, (B) 11c and (C) 11c per 100 lb. Reason—Proposed rates are comparable with rates from Bellefonte to Earnest, Philadelphia and Langhorne, Penn.

25627. **Sand and gravel**, other than blast, engine, foundry, glass, molding or silica, carloads (See Note 2), from Alfred, N. Y., to A. & A. R. R., Sierks, Johnsonburg, Java Center, Arcade, N. Y., and various. Rates ranging from $1.20 to $1.30 per net ton. Reason—Proposed rates are comparable with rates to Belfast, Dansville, N. Y., etc.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

21176. **Sand, building, common or run of bank** (See Note 2), from Avon, Conn., to Danbury, Conn. Present rate, 90c per net ton; proposed, 75c per net ton. Reason—To meet motor truck competition.

21217. To cancel all commodity rates on **burnt dolomite** from origin stations on the N. Y. N. H. & H. R. R. now provided with commodity rates to points in T. L. A. territory to which commodity rates on burnt dolomite are now effective, as named in Items 320, 325, 330 and 335 of N. Y. N. H. & H. R. R., I. C. C. F3065, and apply in lieu thereof class rate. Reason—To clear the tariffs of obsolete rates. No "burnt dolomite" shipped from points on the N. Y. N. H. & H. R. R.

21237. **Run of bank or screened or crushed gravel**, Group A. **Common building sand**, Group B. **Stone**, viz.: Granite, trap rock, quartz, or sandstone, crushed or broken, including grout, rubble or chips (waste products of quarries), Group C. (See Note 3.) To Springfield, Vt.:

Group A: Present, from Manchester, N. H., $2.20; Westboro, N. H., $1.95. Proposed, from Manchester, N. H., $1.55; Westboro, N. H., $1.25.

Group B: Present, from Manchester, N. H., $2.15; Westboro, N. H., $1.90. Proposed, from Manchester, N. H., $1.55; Westboro, N. H., $1.25.

Group C: Present, from Greenfield, Mass., $2.25; proposed, from Greenfield, Mass., $1.40.

Rates per ton.

Reason—To establish commodity rates more comparable with those now in effect to other New England points.

21241. **Stone, broken or crushed**, to South Deerfield, Mass., from Westfield, Mass. Present rate, 95c; proposed, 70c per net ton. (To expire November 30, 1931, unless sooner canceled, changed or extended.) Reason—To meet motor truck competition.

21251. **Stone, crushed**, coated with oil, tar, asphalt or any bituminous binder, in bulk, in gondola or other open-top cars (See Note 3), from Westfield, Mass., to Kearny, N. J. Present rate, combination; proposed, $2.30 per net ton. Reason—To establish rates comparable with existing rates for similar distances.

21331. **Ground feldspar**, from Keene, N. H.

To	Pres.	Prop.
Bridgeton, N. J.	25	22½
Vineland, N. J.	25-32	22½

Reason—Comparable with rates now published from other producing points.

21335. To extend the expiration date of rate of $1 per net ton on **stone, broken or crushed**, and **grout, granite or stone**, in bulk in open cars (See Note 3), from Branford (Pine Orchard Quarry), Conn., Westfield, Mass., and other origin points as shown in N. Y. N. H. & H. R. R. I. C. C. F2795, pages 396 to 400, inclusive, to Providence, Auburn, Harbor Junction Wharf, Olneyville and South Providence, R. I., now published to expire December 31, 1930. Reason—To meet competition, such as motor trucks and barges.

21380. **Crushed stone** (trap rock), (See Note 3), from Westfield, Mass., to Athol, Mass. Present rate, $1.05; proposed, 90c per net ton. Reason—To establish same rate as applied by competing carrier for the distance involved.

21383. **Sand, molding** (See Note 2), from Rocky Hill, Conn., to Long Island R. R. stations included in Groups A and AA, viz.: Long Island City, Winfield, Corona, Blissville and Bushwick, N. Y. Present rate, 20½c; proposed, 19c. Reason—To meet water competitive conditions.

WESTERN TRUNK LINE DOCKET

2292-H. **Stone, crushed** (See Note 2), but not less than 40,000 lb.; when loaded in hopper-bottom ore cars, 75,000 lb., from Randville, Mich., to Wilmington, Joliet and Lockport, Ill. Present rates, to Wilmington $4.90 per net ton (Class E), to Joliet $4.20 per net ton (Class E), to Lockport $4.20 per net ton (Class E); proposed, $2.70 per net ton to all three points.

4357-H. **Lime**, carloads, minimum weight 30,000 lb., from Fort Dodge, Ia., and related points to stations on C. M. St. P. & P. in North and South Dakota, from Claymore to Isabel, Ducharme to Faith, Stratton to McLaughlin, Maple Leaf to New England, Cadillac to Montline, all inclusive. Present rates, class; proposed, same rates as apply from Mason City.

4990-C. **Sand and gravel**, carloads (See Note 2), but not less than 40,000 lb., from La Grange, Mo., to Bricker, New Boston and Argyle, Ia. Present rate, $2.20; proposed, $1.05 per net ton.

Sup. 1 to 6819A. **Cement**, carloads, from Superior, Neb., to Laramie, Wyo. Present rate, 30½c; proposed, 24c per 100 lb.

5549E. **Cement**, carloads, from Rapid City, S. D., to stations in southwestern Minnesota on and south of the line from Fargo, N. D., to Elk River, Minn., and on and west of the line Elk River through the Twin Cities to Albert Lea on connecting lines. Present rate, combination; proposed, I. C. C. Docket 8182 basis.

5932. **Crushed stone**, carloads, from Buffalo, Ia., to Davenport, Ia. Rates per net ton. Present, 41; proposed, 35.

6800-C. **Sand**, carloads (See Note 3), but in no case less than 40,000 lb., from Bowes, Ill., to St. Paul (Fordson), Minn. Rates in cents per ton of 2000 lb. From Bowes, Ill., to St. Paul (Fordson), Minn., 355 miles, present 240c, proposed 215c.

6983-D. **Sand, silica**, carloads (See Note 2), but not less than 60,000 lb., from Browntown, Wis., to representative points.

To	Prop.
Hamilton, Ont.	$3.60
Niagara Falls, Ont.	3.60
Toronto, Ont.	3.90
Windsor, Ont.	3.53

Present rate, combination on Rochelle, Ill. (Complete copy of exhibit will be furnished upon request.)

6819-A. **Cement**, carloads, from Superior, Neb., to Laramie, Wyo. Present rate, 30½c per 100 lb.; proposed, 24c per 100 lb.

7489. **Cement, hydraulic, portland or natural.** To Chimney Rock, Neb. Index No. 6350.

From	Pres.	Prop.
Chicago, Ill.	33	32½
Mason City, Ia.	26½	35½
Austin, Minn.	27½	27
Chanute, Kan.	28	27½
Linwood, Ia.	.....	29
To Gering, Neb.		
Louisville, Neb.	23½	22½
From Louisville, Neb., to	Pres.	Prop.
Haig, Neb.	24½	23½
Baileyville, Neb.	24½	23½
Lyman, Neb.	24½	23½

ILLINOIS FREIGHT ASSOCIATION DOCKET

4687, Sub. 1. **Silica (silex)**, in packages or in bulk, carloads, minimum weight 50,000 lb., from Elco, Gravel Pit, Mill Creek and Tamms, Ill.

To	Pres.	Prop.
Chattanooga, Tenn.	Class rates	29
Cleveland, Tenn.	Class rates	30
Lenoir City, Tenn.	Class rates	32
Nashville, Tenn.	Class rates	23

CENTRAL FREIGHT ASSOCIATION DOCKET

27081. To establish on **slag** (a product of iron and steel blast or open hearth furnaces), in bulk, carloads (See Note 3), from Chicago and points in Chicago district to Argos, Ind., rate of $1.15 per net ton. Present rate, $1.25 per net ton.

27096. To establish on **crushed stone**, carloads (See Note 3), from Lewisburg, O., to Aurora, Ind., rate of $1 per net ton. Present rate, $1.05 per net ton.

27097. To establish on **sand, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica**, carloads (See Note 3), from points in Ohio to points in Canada (and various) rates as shown below. Proposed rates:

From	Agincourt, Ont.	Barry's Bay, Ont.	Belleville, Ont.	Boston, Mass.	Brockville, Ont.
Geauga Lake, O.	411	626	471	502	511
Phalanx, O.	399	614	449	490	499
Bedford, O.	449	664	499	490	549
Massillon, O.	449	664	499	490	549
Dundee, O.	449	664	499	490	549
Barr, O.	449	664	499	490	549

From	Chalk River, Ont.	Derby Line, Vt.	Halifax, N. S.	Kingston, Ont.	Mattawa, Ont.
Geauga Lake, O.	686	576	821	471	686
Phalanx, O.	674	564	809	449	674
Bedford, O.	724	614	859	499	724
Massillon, O.	724	614	859	499	724
Dundee, O.	724	614	859	499	724
Barr, O.	724	614	859	499	724

From	Mont Joli, Que.	Montreal, Que.	Mulgrave, N.S.	Muskoka, Ont.	North Bay, Ont.
Geauga Lake, O.	801	511	861	501	576
Phalanx, O.	789	499	849	489	564
Bedford, O.	839	549	899	539	614
Massillon, O.	839	549	899	539	614
Dundee, O.	839	594	899	539	614
Barr, O.	839	549	899	539	614

From	Oshawa, Ont.	Ottawa, Ont.	Parry Sound, Ont.	Pembroke, Ont.	Port Hope, Ont.
Geauga Lake, O.	411	511	536	626	461
Phalanx, O.	399	499	524	614	449
Bedford, O.	449	549	574	664	499
Massillon, O.	449	549	574	664	499
Dundee, O.	499	549	574	664	499
Barr, O.	499	549	574	664	499

From	Quebec, Que.	Renfrow, Ont.	Riviere du Loup, Que.	St. John, N. B.	Ste. Louise, Que.
Geauga Lake, O.	651	576	736	801	736
Phalanx, O.	639	564	724	789	724
Bedford, O.	689	614	774	839	774
Massillon, O.	689	614	774	839	774
Dundee, O.	689	614	774	839	774
Barr, O.	689	614	774	839	774

From	Sault Ste. Marie, Ont.	St. Johns, Que. Stanstead, Que. Sherbrooke, Que.	Sudbury, Ont.	Sydney, N.S.
Geauga Lake, O.	686	576	676	901
Phalanx, O.	674	564	664	889
Bedford, O.	724	614	714	939
Massillon, O.	724	614	714	939
Dundee, O.	724	614	714	939
Barr, O.	724	614	714	939

Present rates, classification basis.

27124. To establish on **lime, common, hydrated, quick or slaked** (except agricultural or fluxing lime

having no commercial value for chemical or building purposes), minimum weight 30,000 lb.: From Carey, O.—Proposed rate, (4) 21c; present rate, (1) 24c. From Marion and Owens, O.—Proposed rate, (4) 21½c; present rate, (2) 30½c; (3) 31c.

(1) Applies via all gateways except Menominee, Mich., via which rate is 23c per 100 lb.

(2) Applies from Marion, O.

(3) Applies from Owens, O.

(4) Routing: Via C. & O. Ry., Toledo, O., A. A. R. R. or P. M. Ry. to Manitowoc, Wis., thence C. & N. W. Ry. beyond. Via C. & O. Ry., Toledo, O., A. A. R. R. or P. M. Ry. to Kewaunee, Wis., thence G. B. & W. lines beyond.

27126. To establish on **dolomite, burnt or roasted,** carloads (See Note 3), from Granite City, Ill., to Kokomo, Ind., rate of $2.38 per net ton. Present rate, $2.60 per net ton.

27130. To establish on **burnt or refuse foundry sand,** carloads (See Note 3), from Sharon, Penn., to Cleveland, O., rate of 90c per ton of 2000 lb. Present rate, $1.25 per ton of 2000 lb.

27132. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) **and gravel,** in carloads (See Note 3), from Bemus Point, N. Y.

To—	Prop.	To—	Prop.
Springfield, Penn. ..	110	Frewsburg, N. Y...	110
Fairview, Penn.....	110	Fentonville, N. Y.	120
Swanville, Penn.	110	Starbrick, Penn.....	120
Moorehead, Penn. ..	100	Irvington, Penn.....	130
North East, Penn...	90	Doteyville, Penn.....	130
Fredonia, N. Y.....	100	Fieldmore Springs,	
Moons, N. Y.....	100	Penn.	140
Sinclairville, N. Y.	110	Titusville, Penn.....	140

Present: Class.

W. D. A. 26956, Sup. 1. Amend White Docket Advice No. 26956, Docket Bulletin No. 1892, dated December 4, 1930. Proposal to establish rates on **cement, common, hydraulic, natural, or portland,** from Coldwater and Quincy, Mich., to points in Wisconsin by including proposed rates from Cement City as follows:

From Cement City, Mich., to Wisconsin points on C. M. St. P. & P. R. R.

	*Pres.	Prop.		*Pres.	Prop.
Somers	23½	14	Waukesha	23½	15
Sturtevant ..	23½	14	Granville	23½	15
Burlington ..	23½	14½	Templeton ..	23½	15

To Wisconsin points on M. St. P. & S. S. M. R. R.

Wheatland ..	23½	14½	Duplainville..	23½	15
Burlington	23½	14½	Templeton ..	23½	15
Waukesha ..	23½	15	Rugby Jct. ..	23½	15½

*Sixth class.

27167. To establish on **sand and gravel,** in bulk, in open-top cars (See Note 3), from Massillon, O., to Akron, O., rate of 60c per ton of 2000 lb. Present rate, 70c per ton of 2000 lb.

27176. To establish on **lime,** carloads, from Mitchell, Ind., to Wisconsin Dam, Wis., rate of 22½c per 100 lb., carload minimum weight 30,000 lb., and 20c per 100 lb., carloads, minimum weight 60,000 lb. Present rate, 24c, minimum weight 30,000 lb.

27187. To cancel the following commodity rates on **concrete and cement building blocks** (not reinforced with metal), carloads, minimum weight 50,000 bl., from Rock Point, Penn., to points in Pennsylvania, published in B. & O. R. R. (east) Tariff P. S. C. Penn. No. 2648, effective April 30, 1929, viz. (per 2000 lb.):

To Penn. points	Rate	To Penn. points	Rate
Rice's Landing.....	$2.52	Cowden	1.77
Cliff Mine	1.77	Hyland	1.77
Imperial	1.77	Library	2.02
North Star	1.77	McIver	2.02
Southview	1.77	Smock	2.27

On account of being obsolete, classification basis to apply in lieu thereof.

27188. To establish on **molding sand,** carloads (See Note 3), from Rockport, Hatfield, Sandale, Ind., and other points on the Southern Ry. and the E. & O. V. Ry., named in Item 1815 of C. F. A. L. Sand Tariff 155R, I. C. C. 2289, to Sheboygan, Wis., rate of 300c per net ton. Present rate, 337c per net ton.

27216. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) **and gravel,** carloads (See Note 3), from Jonesville, Mich., to Narlo, O., rate of $1.27 per net ton. Present—16c (6th class).

27221. To establish on **soapstone and talc,** straight or mixed carloads, minimum weight 50,000 lb., from Chatsworth, Ga., to Detroit and Dearborn, Mich., rate of 529c per net ton. Present—589c per net ton.

27241. To establish on **spent or refuse grinding sand,** in open-top cars, carloads (See Note 3), from Butler, Penn., to Wampum, Penn., via B. & O. R. R., New Castle Jct., Penn., P. & L. E. R. R., rate of 90c per ton of 2000 lb. Present rate, $1 per ton of 2000 lb.

27247. To establish on **sand and gravel,** carloads (See Note 3), from Troy, O., the following rates in cents per net ton: *Per 100 lb.

To	Prop.	Pres.
Decatur, Ind.	110	(2)207
Rivare, Ind.	110	(2)207
Wren, O.	100	(3) 17*
Glenmore, O.	100	(3) 17*
Ohio City, O.....	100	(1)140
Elgin, O.	95	(1)140
Converse, O.	95	(1)140

(1) Cincinnati-Ohio City rate under intermediate rule.

(2) Cincinnati-Decatur rate under intermediate rule.

(3) Sixth class rate.

27248. To establish on (a) **Stone, crushed,** in bulk, in open-top cars; **stone screenings,** in bulk, in open-top cars, in straight or mixed carloads, from Kenneth, Ind.

(b) **Sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) and **gravel,** from Kenneth and Lake Ciecott, Ind., to Decatur, Ind., rate of $1.05 per net ton. Route—Pennsylvania R. R. Present rate, $3 per net ton (classification basis).

I. C. C. Proposed Reports

23236. Asphaltic Limestone. Alabama Rock Asphalt, Inc., vs. Akron and Barberton Belt. Examiner John McChord has found the rates on asphaltic limestone, carloads, Margerum and Cherokee, Ala., to points in official classification territory, unreasonable to the extent they may exceed for the future 80% of the maximum rates that would accrue under the scale adopted for the construction of rates on asphaltic limestone from points here involved to destinations in southern territory as stated in Colbert Limerock Asphalt Co. et al. vs. A. C. R. R. Co., 129 I. C. C. 177, said scale to be projected into central and trunk line territories with a like rate of progression. Reparation, the report said, should be denied.

22204. Cement Plaster. Baker and Holmes Co. vs. S. A. L. et al. Examiner Harold M. Brown, on further hearing and reconsideration, recommends that Ewing, Fla., be found not to be within the switching limits of Tampa, Fla.; that applicable carload rate on cement plaster from Agatite, Tex., to Ewing over route shipment should have moved was $9.72, plus reconsignment charge at Jacksonville of $2.25 and diversion charge of $5.85 at Tampa; that the rate and charges herein found applicable over route referred to not shown to be unreasonable except the diversion charge of $5.85; that complainant has been damaged in the amount of difference between charges paid and those which would have accrued at a combination rate of $9.72, plus $2.25, the reconsignment charge at Jacksonville, and is entitled to reparation from the Seaboard of $89.89 with interest. Original report in 161 I. C. C. 441 should be modified.

I. C. C. Decisions

22009. Oyster Shells, etc.—A finding of unreasonableness and prescription of rates for the future have been made by the Interstate Commerce Commission in No. 22009, Atlantic Shell Co., Inc., et al., vs. A. C. L. et al., with respect to rates on oyster shells, whole, oyster shells, crushed, and oyster shell dust, in carloads, from Jacksonville, Fla., to points in Georgia, in a report written by Commissioner Lewis.

The commission found that the rates assailed on crushed shells were and for the future would be unreasonable to the extent they exceeded or might exceed 15% of the corresponding first class rates, subject to a minimum weight of 50,000 lb., and that the rates assailed on whole shells and shell dust were and for the future would be unreasonable to the extent they exceeded or might exceed rates set forth in appendix 1 of the report, subject to a minimum weight of 60,000 lb. The scale prescribed for whole shells and shell dust begins with 65 cents a ton of 2000 lb. for single-line and 75c for joint-line hauls for 20 miles and under and ends with $2.10 for single-line and $2.10 for joint-line hauls for 400 miles and over 380 miles. At 50 miles and over 40, the rates are 95 cents for single-line and $1.05 for joint-line hauls. At 100 miles and over 90 the single-line rate is $1.30 and the joint-line rate, $1.35. At 200 miles and over 180 the single-line rate is $1.60 and the joint-line rate is the same. The scale prescribes the same rates for single-line and joint-line hauls over 100 miles. The commission said nothing of its findings should be construed as prohibiting reasonable groupings of destinations. It found that allegations of violations of sections 3 and 13 of the act in connection with alleged preferential Georgia intrastate rates had not been sustained. Commissioner Porter noted a dissent and Commissioner Tate did not participate in the case.

23332. Portland Cement. Medusa Portland Cement Co. vs. New York Central et al. By division 3. The rate on portland cement from Bay Ridge, O., to York, Pa., has been found not unreasonable, and complaint has been dismissed.

Cars for Stone Loading

THOUGH the Interstate Commerce Commission, in No. 20699, Alexander King Stone Co. vs. Chicago, Indianapolis and Louisville, 160 I. C. C. 245, found that the failure of the defendant to furnish cars for loading with stone, between October 4, 1927, and March 15, 1928, was unjust, unreasonable and unduly prejudicial, Special Examiner John L. Rogers, on further hearing in that case, has recommended that the commission deny reparation, on the ground that the complainant had not been damaged because of the undue prejudice, or the unjust and unreasonable practice. This further hearing was had as to the amount of the damages, if any, which were sustained.

The defendant refused to furnish cars in the period mentioned on the ground that the track to the complainant's limestone quarry, at Stinesville, Ind., was unsafe for operation. The commission, by division 6, found that in the period mentioned it was reasonably safe for the track to be used and that it was the legal duty of the railroad to respond to the complainant's reasonable requests for transportation.

At the hearing as to damages the complainant and the railroad submitted facts about quarrying and selling limestone, one to prove that it lost money by reason of the failure to furnish cars and the other to prove that even if cars had been furnished the stone company could not have produced stone of a definite classification, at a profit, in the period in question. Examiner Rogers, in commenting on testimony of the complainant to the effect that it could have sold stone of a particular quality or classification, said that there was no question on that point; that the railroad admitted that there was a good market for such stone and that the question presented was whether complainant could have produced stone of that particular classification in its quarry, and, if so, in what quantity.

Examiner Rogers, in his conclusions, laid down the proposition that in the consideration of this case, dealing with private rights and wrongs, the commission was acting in a quasi-judicial capacity. To award damages alleged to have been incurred by reason of unjust discrimination or undue prejudice, he said, there had to be "that degree of certainty and satisfactory conviction of mind and judgment of the commission as would be deemed necessary under the well-established principles of law as a basis for a judgment in court."—*The Traffic World.*

Sand Rate Investigation Continued

Hearings Before the Interstate Commerce Commission on Industrial Sands at Chicago

IN the September 27, 1930, issue of Rock Products was published a report of the proceedings on the Industrial Sand Cases held before the Interstate Commerce Commission, at Washington, D. C. The September hearing, lasting ten days, was carried over to January 13, 1931, and held at the Sherman hotel, Chicago, Ill., where a nine-day session completed the presenting of the evidence before Examiner Burton Fuller.

The significance of these cases to rock products producers is considerable, for it is possible and quite probable that a basis of rate making may be adopted in the future as a foundation for commodity rates which may be later established on materials that were not involved in these proceedings. This statement does not imply that producers of such material will not have an opportunity to present their case in such an event, but it does mean to imply that should they have their day in court, the findings of the Interstate Commerce Commission in this case will probably be used as a foundation or base case for further adjustments.

Of course, all previous findings of the Interstate Commerce Commission can be and are used in making other adjustments, but as this investigation is of a low grade commodity, in fact one of the lowest grade commodities hauled by railroad carriers, and is of such great scope, the case will have great weight in future adjustment cases on all similar "low grade" commodities.

An Attempt at Scientific Rate Making

To give the reader an idea as to "what it was all about," it might be well, for the moment, to go back in early railroad-rate making history and assume that a sand producer asked for a rate on his material to a point of use. The railroad gave him such a rate, but undoubtedly the rate given was an arbitrary figure and had no real basis other than being all the traffic would bear. Later another sand producer asked for a rate to a shipping point and then another and another, until the whole freight rate structure on sand became highly complex, with some shippers having rates per mile higher or lower than other shippers of sand.

To complicate the picture, probably ordinary sand was first shipped and later as the uses of sand broadened, there entered the question as to rates on different *kinds* of sand. The railroads held and continued to maintain that they were justified in assessing a higher rate for so-called high grade sands than on the so-called common sand. This led to tariff confusions as it became difficult to define sand on the basis of use without some overlapping. In other words, when does core sand cease to be core sand and assume the role of glass sand or vice versa?

With these freight and description factors becoming yearly more complicated, it became essential for someone to prescribe and present a method of fixing freight rates that could be used as a basis for further freight-rate making cases that would eliminate this confusion as much as possible, and this is in essence what was attempted in this case.

Of course, it is understood that in these particular cases only those industrial sands involved in the proceedings would be applicable to the rate-making bases proposed, but once a proposal is adopted, precedents may be established that in years to come will affect other commodities of kindred character.

There was not a unanimity of opinion as to some details by either the carriers or shippers, but in its broader sense there were agreements of opinions held by the two contesting parties, carriers and shippers. Differences of opinion among the shippers were largely as to differences in rates that should be assessed on open-top and closed-top cars, one faction, represented by Edwin Brooker, contending that there was justification for a slightly higher rate for closed-top cars as contrasted with open-top cars, while others maintained there was no such justification. The carriers, however, all seemed to agree, with one exception, that a commodity shipped in box cars should take a higher rate than one in open-top cars.

A Liberal and Technical Education

The testimony presented by both shippers' and carriers' witnesses was in many cases so highly involved and of such a radically different kind that it is doubtful if there were more than two or three people present who could comprehend and absorb what was taking place and properly weigh its ultimate significance. Some of the representatives and attorneys well versed in traffic matters could understand and appreciate traffic testimony, but when scientific evidence dealing with crystalline structures of sand was presented, many were unable to follow the witnesses' declarations clearly; or when a concrete construction engineer delved into tolerances in screen analyses, and water-cement ratios, still others were obviously unable to follow the testimony. To those who did attempt to follow the proceedings closely, it was a liberal education in science, geology, concrete engineering and intra- and interstate traffic and their relations to sand of all varieties. The mass of evidence presented in the form of exhibits was unbelievably large, numbering some 550 exhibits, with an exhibit, in many cases, being a small volume in itself.

Procedure

It will be a year or more before a decision can be given in this case, and subsequent procedure following the hearing of the evidence here reviewed is roughly as follows:

The plaintiffs' and defendants' attorneys file written briefs with the commission. Such briefs, by stipulation of Examiner Fuller, must be received before April 1, 1931. The Examiner then files his report, which is his proposal after hearing all the evidence and after further study of the exhibits filed.

Following filing of the Examiner's report, the interested attorneys can file written "exceptions" to the Examiner's report and following this, oral arguments will be heard by three of the eleven commissioners. After hearing the oral arguments at Washington at some future date, the commission will render its decision.

Shippers' Proposals

At the September, 1930, hearing at Washington, D. C., Ralph E. Riley, Chicago, Ill., as a shippers' witness presented a proposed method of adjusting rates which was substantially as follows:

1. No difference in rate between open- and closed-top cars.

2. One classification for sand as *sand*, such descriptions as core sand, molding sand, etc., to be eliminated from the tariff on the sands involved in this controversy.

3. A zoning scale of rates as follows: 10 miles or less $0.50 with a progression of 5c for each 10 miles from 10 to 100 miles and 5c for each 35 miles beyond 200 miles.

At the Chicago hearing it was contended by the carriers' counsels that such a proposed rate would seriously reduce the railroads' revenue, and voluminous exhibits of railroad earnings on sand were presented to bear out the railroads' assertion, but Mr. Riley, in rebuttal, maintained his position.

Edwin Brooker, Washington, D. C., representing the Industrial Silica Corporation, also submitted a rate-making proposal which was based on a zoning arrangement which was in substance as follows: 60c per ton for the first 20 miles. Then 10c per ton per

20 mile block up to 100 miles. After 100 miles the blocks are increased to 25 miles at 10c per ton per block up to 250 miles. After 250 miles blocks increase to 30 miles at 10 cents per block.

Mr. Brooker's scale allows also a 15% increase in rate of closed-top cars over open-top cars and also proposes one scale on all kinds of sand.

Carriers' Proposals

The carriers proposed a maintenance of present commodity descriptions and also proposed as a basis of rates from Albany group to Trunk Line and Central Freight Association areas of 16% of first class or the so-called Column 16 rate. To New England, 20% of first class was proposed.

Mr. Brooker, in rebuttal, maintained that such a rate would mean ruination for many sand producers.

When a railroad attorney was asked as to the ultimate effect this case would have upon the sand and gravel industry as a whole, he gave the weighty reply that no matter what the decision was, it would not increase or decrease by one ton the *volume* of material moved. The reason for this evasive reply became apparent later in the proceedings as it became evident that the carriers intend, in the future, to ask for an elevation of rates on all sand, but did not commit themselves at this hearing to this general statement. The adjustments in rate-making they did propose, however, would mean an elevation of rates to many shippers and a depressed rate to others.

It is evident that no matter what basis for adjusting rates is adopted, some producers will suffer, even face extinction and, according to Mr. Brooker, if the railroads' proposal is adopted, it will mean ruination, as is later pointed out in this review, for many present shippers.

Attempts to Define Various Sands

Most of the mass of evidence that was submitted at the hearing by the various witnesses was information intended to clear up all points regarding the transportation and use of sand so that the Commission would have a true picture of the entire industry before passing its decision. The first few days of the hearing were devoted to such witnesses.

At the first day's session at Chicago, after Examiner Fuller had received several intervenor's petitions, O. W. Potter, professor of engineering of the University of Minnesota, was called to the stand by Luther M. Walters. Prof. Potter represented the shippers in the Michigan City district and his entire testimony was devoted to defining the various kinds of sand, molding sand, core sand, etc., and he confined his definitions to such authorities as the United States Bureau of Mines, R. B. Ladoo, and other previously published authoritative descriptions of these commodities.

To sum up his statements, he proposed that sands be divided into three classes. In Class No. 1 he put bonded molding sand. Class No. 2 consisted of silica and manufactured products and common sand. He stated that molding sand should be kept in a separate classification due to its location, method of recovery, chemical composition, bond characteristics, and he avoided as much as possible reference to its description by use. He grouped the silica sands by difference in geological location, chemical composition, grain shape and color, and grouped commercial sands, or so-called common sands, in Class No. 3, the lowest, for obvious reasons. He contended in this grouping that there was a minimum of overlapping, that the different commodities were easily distinguishable by their general appearance and that the materials had widely different cost characteristics. Attorney Walters at the same time showed advertisements carried in the technical journal *The Foundry* in which silica sand was advertised as silica sand, thereby contending that there was a silica product that was recognized in the trade as such.

In the cross examination of witness Potter, it became apparent that there was an overlapping of definitions; for instance it was cited where a molding sand deposit was overlaid with a commercial sand deposit. At one time of the year molding sand was shipped as molding sand, and during the remainder of the year the other stratum was shipped as commercial sand, yet the products came from the same pit and so far as the railroad was concerned it would be difficult for them to police such shipments to determine whether they were actually used as building sand or molding sand.

It was apparent after hearing the cross examination of witness Potter that the adoption of his classification would not solve all the difficulties in connection with the description of sand.

Ray Williams, representing the Olive Branch Mineral Products Co., contended that Prof. Potter's classification was not workable. Mr. Williams represented silica producers in southern Illinois, and he stated that he would supply a commercial witness to bear out some of his assertions before the hearing ended. On the last day of the hearing, however, he had procured no such witness and attempts were made to have all of his testimony stricken out, which was unsuccessful.

Tripoli Silica But Not Sand

To clear up some of the points on the use and description of tripoli, Ray Hancock, representing Seneca, Mo., producers, was called to the stand. He described the uses, properties and manufacturing methods used in connection with tripoli. He stated that tripoli was sold for from $3 to $13 per ton, f.o.b. loading point, and that the average price would be between $9 and $10. This material, he said, is always shipped in paper-lined burlap sacks and is used for foundry facings, polishes, rubber fillers and insecticides. Most of the information he gave was descriptive in nature and could only be of value to the Commission in defining tripoli. He stated, however, that it was mostly 98% silica and most of it would pass a 300-mesh screen.

Against Any Change

J. W. Matthews, treasurer of the Huntington & Broad Top railroad, next took the stand and outlined the financial condition of his company and told of two shippers on his lines that would be ruinously affected if any changes were made in the present rate structure. Most of his testimony was towards keeping the rates at their present level and description of commodities as now appear in the tariff.

On the second day, several witnesses were called, among whom could be mentioned L. H. Zimmerman, traffic manager of the Malleable Iron Range Co., T. J. McLaughlin, of the Ayres Mineral Co., and Charles E. Vose, general traffic manager for shippers in the Albany district. Most of this testimony was in general to show the wide discrepancies in the present tariff descriptions and tariff rates.

Edwin Brooker then took the stand and presented his rate proposal which was previously mentioned.

On the morning of the third day, J. F. McWilliams, chief clerk of the Chicago & Eastern Indiana railroad, took the stand and briefly testified regarding amorphous silica deposits in southern Illinois and referred to Mr. Williams' previous testimony. He advocated equalizing certain rates in southern Illinois and excluded ground clay, but included silica and ground silica.

Mr. Brooker then took the stand for the second time and continued his testimony of his proposed rate scale idea. Mr. Brooker made an excellent witness for his proposed scheme and maintained his position very ably during the cross examination.

E. J. Campbell, president and general manager of the Sun Sand Co., Thayer, W. Va., told the examiner of his operations and products and objected to a change in rates, as such would seriously jeopardize his continuance in business. He stated that he had a high-cost operation and that it was only due to his favorable freight rates that he was able to exist at all in competition with other low-cost operators. He believed that box car shipments should receive a higher freight rate than gondolas, as it was difficult to get good cars and on account of superior freight service afforded to closed-top cars as compared to open-top.

E. M. Durskin, treasurer of the Keener Sand and Clay Co., Columbus, Ohio, took the stand and testified that the industry he represented would perish unless the present freight rate structure is maintained.

Railways Contend for Higher Rates

Following Mr. Durskin, the carriers proceeded with the presentation of their side

of the case, their first witness being R. W. Morris, of the Chesapeake and Ohio. He maintained that any changes in the freight structure would cause losses in revenue to his clients and that such loss in tonnage would be irreplaceable. It might be said at this time that all of the railroad witnesses presented extensive and voluminous exhibits showing the railroads' earnings for the months of June and July of 1929 on sand hauled. These earnings were classified in rates per ton, per ton-mile, single- and joint-line rates, etc., and practically in every instance were intended to show that either Mr. Riley's or Mr. Brooker's proposed rates would work a hardship on the carriers, and that the carriers' proposed scale of 16% of first-class for Trunk Line and C. F. A. territories would approximately maintain the present revenues of the carriers. These exhibits were of such voluminous extent that it would take months of study for the uninitiated really to arrive at the correctness and justness of their contention.

Railroad witnesses on the third day were Henry Christianson, of the Burlington, H. W. Schaffer, of the Rock Island and G. C. Miller, of the Baltimore and Ohio. Mr. Miller stated that some changes must be made in the present rate structure to make for uniformity.

One Railway That Defends Low Rates from Michigan City

H. L. Baird, of the Chicago & Eastern Indiana, explained the position of his company with regard to the movement of Michigan City sand and gave a historical review of that field, stating that the present low rate from the Michigan City district was primarily started as it was advantageous to his company to haul cheaply sands from that district to prevent their accumulation on the track. This caused quite a little laugh. He held that the Michigan City grouping should be maintained.

Mr. Baird continued his testimony on the morning of the fourth day. He submitted a sample of the sand from the Fairview Sand and Gravel Co.'s deposit, contending that it was a representative sand as used in concrete. This was intended for a comparison of grain size with that of the Michigan City district. During the cross examination of Mr. Baird, it was brought out that where he advocated different rates on different grades of sand, high-class new passenger automobiles and second-hand automobiles carry the same rate. His questioner contended that if this was the fact, then sands of all grades should carry the same rate. This was only one instance of several that could be cited along this same line of thought. Mr. Baird stated that Michigan City sand was not used for fill purposes, and this was in direct contradiction to previous testimony that Michigan City sand was used for fill purposes. He disagreed with Prof. Potter's description and classification, stating that it was not workable.

Confusion from Various Uses for Same Sand

William Collin, Jr., attorney for the Pennsylvania Glass Sand Corp., one of the plaintiffs in this action, brought out through this witness that the present rate structure was a "hodge podge" of rates and that there had been difficulties in applying commodity descriptions on his line. He also brought out the fact that it would be difficult for railroads to police shipments if "use descriptions" continued to be used.

When Mr. Baird was cross examined by Attorney Brooker, it developed that sands which were designated on bills of lading were carried in the witness' exhibits as molding sand. Mr. Brooker showed the witness memorandum copies of bills of lading, all bills having sand designated as No. 4 sand, one consigned to a building supply company, another being a consignment to a steel company, and the third bill of lading being consigned to a construction company. The witness was asked to tell the examiner by what authority the agent could assess silica sand rates on these commodities. He also asked why it was that the local agent of the railroad could change gravel so that it would become silica sand for railroad records, and for freight-rate making purposes, as car numbers on these bills of lading corresponded to witness' written exhibits as molding sand. This evidence was all to show that if the "use description" of sand was adopted, the agent at the point of shipment would be the one to determine to what use the sand was to be put and hence what rate would be assessed, and that the agent could not have information that would correctly interpret this question. The witness stated that the agent would make assumptions on the first shipment and if there was any question about it later, that the railroad would make a thorough investigation and clear up inequalities that might exist.

C. C. Plummer was the next witness, for the Pennsylvania railroad, and in substance he advocated that present tariff descriptions be maintained and that the railroads' proposed Column 16 rate be applied on sand involved in this hearing.

Geologist Appears for Railroads with Proposed Classification

Following Mr. Plummer, Prof. Charles R. Fettke, professor of geology at the Carnegie Institute of Technology, appeared for the carriers and spent the best part of two days on the stand, giving an outline of the geology of sand and uses and distribution of sands involved. Prof. Fettke has spent many years in making various geological studies of industrial sands in Pennsylvania and their locations, and he attempted to clear up for the Commission points covering the descriptions of the different kinds of molding, core, furnace, potter, abrasive, stone sawing, and other industrial sands. He contended that most of the silica sands in Pennsylvania were unsuitable for concrete but this was ably refuted later in the hearing by S. S. Woods, president of the Pennsylvania Glass Sand Corp., who at that time gave evidence that the states of Maryland and West Virginia had accepted such sands and had actually used such sands in state highway work. Prof. Fettke gave a grouping of sands to be used as a basis for future rate making, dividing sands into three groups. His Group No. 1 was common sand used for building and other purposes. This group he believed accounted for 90% of the total sand production, and its chemical composition was not so important. In his Group No. 2 he placed silica sand having a silica content of 95% or better. In Group No. 3 he placed natural molding or core sands. He maintained that there was a very small overlapping in use when this grouping was made, but it developed later in the hearing and on cross examination that there would be some overlapping if "use description" continued to be used. Considerable attention was given to Mr. Fettke's grouping later in the hearing, but it was evident that there would not be a great deal of advantage to be had by adopting his proposal for the sake of clarity in traffic matters.

Mr. Riley contended that if a group arrangement were to be made on sands, of all those submitted he believed the grouping proposed by Prof. Souseman in his book "Properties of Silica" would be the most acceptable of any proposed. Prof. Souseman's classification was presented at that time by Mr. Riley.

It was not to be inferred that Mr. Riley wanted any grouping of sands, but that if the Commission deemed a grouping advisable, in his opinion, Souseman's classification is the best. This classification is in two groups, one group based on physical attributes and the other on the chemical attributes of the sand.

Silica Sand for Concrete

Fred H. Jackson, senior engineer of tests of the United States Bureau of Public Roads, was next presented as a carrier witness, and he discussed the use of silica sands for concrete making purposes and stated that high silica sands of the grain analysis submitted by previous witnesses were not satisfactory sands for federal road making purposes, and outlined the reasons why such sands were unsatisfactory, the main reason being that they were not of sufficiently large grain size, and that they were improperly graded. He stated that sands of a coarser gradation than those submitted were necessary to maintain strength, and that if fine sands were used, excessive amounts of water would be required, which in turn would call for a larger use of cement, thereby increasing the unit cost for such concrete. His testimony in this regard was refuted by Mr. Woods for the same reason that Prof. Fettke's was.

During the cross examination of witness Fettke by William Collin, Jr., on the sixth

day, it developed that there would be some overlapping if his commodity descriptions prevailed and that his classification would not clear up this subject entirely. At this point lively discussions took place regarding the use of the term silica and silicates, and the respective amounts of these materials in sands of various grades. The discussion was so involved that it is doubtful if any of the railroad attorneys followed the ideas expounded by Prof. Fettke, and only a few of the shippers' attorneys apparently understood clearly the differentiation between silica and silicate content.

Attorney Collin asked the witness to identify sand without reference to its use, and this the witness said would be very difficult. Mr. Collin then brought out that if it was difficult for a man with the wide knowledge of sand which Prof. Fettke has, how could he expect a railroad agent to be able to define sands and determine what their use would be? Mr. Brooker brought out from witness Fettke that if his proposed classification was used, it would be necessary to examine all the shippers' plants and materials to determine to what classification they would belong, thereby adding still more confusion to an already mixed-up mess.

John N. Bos, of the John N. Bos Sand Co., with plants at Michigan City and Willow Creek, Ind., took the stand and gave testimony and information on the method of operation, cost and use of Michigan City sand. Mr. Bos was in favor of maintaining the present freight rate structure.

How to Distinguish Molding Sand?

Another carrier witness to appear was John Durfee, of Delmar, N. Y. Mr. Durfee stated that he had been employed as a molder for many years in foundry work and later as a salesman selling molding sand, and that he had spent about 50 years in these two lines of endeavor. The railroads presented him as a witness so that he could supply the Commission with information describing the details of how core sand, molding sand, parting sand and facing sand were used. He stated on cross examination that it would be difficult for him to tell silica sand from common sand but that he could distinguish molding sand from building sand by its appearance and texture.

Railways Present Data on Earnings

O. Beggs, assistant freight traffic manager of the Baltimore and Ohio railroad, took the stand and his testimony was similar to that of the following witnesses and was merely to show that the present earnings of the carriers are no more in excess or less than would be the case were the 16% of first class rate applied. He, as had following railroad witnesses, based his assertions on a mass of evidence of shipments moving from shipping centers in the districts involved. He showed the earnings for two months in 1929, namely June and July, and compared them with probable earnings were the various commodity scales proposed applied.

Box Cars Prepared for Shipments?

B. C. Groves, trainmaster for the Baltimore and Ohio railroad, testified on the seventh day as to the details of car movements from the Berkeley Springs and Hancock, W. Va., districts. He stressed the necessity of a rigid inspection of box cars for shipment of silica sand, and his whole testimony was intended to show that the railroads were put to considerable expense in supplying Berkeley Springs and other silica producing centers with box cars that would be suitable for their use.

His testimony was quite impressive until the last day of the hearing, when Mr. Wood, of the Pennsylvania Glass Sand Corp., presented actual photographs of cars that were spotted at the shipper's plants, supposedly after being rigidly inspected. These photographs caused quite a stir, for they were of interiors of box cars that were very unsuitable for sand shipments, and showed that if the railroad had made even a casual inspection they never would have been spotted at the shipper's plant. Mr. Collin brought out the fact that the reason for the rigid inspection was not related to the sand industry at all, but was due to other commodity shippers insisting on a more rigid inspection of box cars. It would be inferred from the witness' testimony that the railroad was put to the additional expense of this inspection due to sand movements entirely when, as Mr. Collin pointed out, sand movements had nothing to do with it.

More Evidence of Mixed-Up Rates

Mr. Huntington, freight traffic assistant for the Central of New Jersey railroad, presented his testimony outlining conditions in the state of New Jersey, and he stated that changes were not necessary nor desired by his carrier. He believed that a mileage scale would allow no flexibility and would tend to "freeze the rates," and that his company would be unable to make a fair revenue on sand carrying. Most of his answers to questions on cross examination were to the effect that they were only interested in maintaining present schedules on all grades of sand.

Witness Beggs returned to the stand for cross examination on the morning of the eighth day, and it developed that rates in B. & O. territory varied 100% in some distance scales and was about as unsystematic a rate basis as on any commodity in eastern Trunk Line territory.

S. E. McMasters, supervising agent of the Pennsylvania railroad, was another carrier witness, and he gave information to the commission as to what procedure the agents follow in billing cars from the shipper's original bill of lading. It appeared, according to this witness, that some sand was shipped from the eastern Pennsylvania glass sand district which was for export and carried a value declaration up to as high as $18 per ton. This testimony was intended to bring out the differences in values of the product involved in the case. Later it developed that this $18 product was one car of specially ground silica to be used for experimental purposes in the manufacture of paint and was of such fineness that it had to be run through the grinding mills several times to get it to the desired fineness. The product was also shipped in paper bags, thereby adding to the cost.

George T. Daily, appearing for the Pennsylvania railroad, presented exhibits showing the tonnage movements, revenues and other data pertaining to sand movements over the Pennsylvania railroad. He also gave many exhibits of rate structures starting in 1908, this being more or less of a historical exhibit of freight rate structures, all tending to show that the present rates on sand were not unreasonable, even though several rate increases had been authorized since 1908, as carriers were not benefited to any great extent. He admitted the difficulties of "use descriptions." He also maintained that the scale proposed by witness Riley would cause a serious reduction in revenue for the Pennsylvania road, and said he believed the 16% of first class schedule would maintain railroad earnings at their present level.

New England Railroads' Case

The ninth and last day of the Chicago hearing for the most part was taken up by witnesses for railroad companies in the New England territory. Witness Fairfield, for the New York, New Haven and Hartford railroad, outlined for the Commission operating conditions in the New England states, all of which was intended to show that conditions were such as to justify a higher scale than that of Trunk Line carriers. It will be recalled that for New England a scale corresponding to 20% of first class was proposed, and Mr. Fairfield's testimony was to justify this increase in rate. He cited an instance where the railroads were put to considerable expense in handling sand movements.

Attorney Vose brought out on cross examination of this witness that the railroad referred to had to maintain railroad service as part of its charter agreements and that the revenues derived from sand movements were not an additional expense but were really very valuable to the carrier as no other traffic was moved over this particular line in any volume. The witness brought out that in New England there was a great diffusion of sand traffic originating on the system, in fact a greater diffusion than with any other commodity, and that the traffic density of this commodity was very light compared with other systems, thereby increasing their operating costs.

J. J. O'Neal, of the statistical department of the New York, New Haven and Hart-

ford railroad, presented operating statistics and other data tending to confirm testimony by witness Fairfield.

Owing to the illness of witness C. I. Johnson, who was to appear for the New York Central railroad, it was agreed that E. C. Calhoun, assistant general solicitor of the New York Central, would be allowed to present his testimony. As Mr. Johnson was unable to be present for cross examination, it was further agreed that in the event any of the attorneys wished to cross examine Mr. Johnson, the New York Central would arrange for such cross examination at a future date at Washington, D. C. Attorney Calhoun subscribed to the 16% of first class for the Trunk Lines and C.F.A. territories and the 20% of first class for New England territory. He also believed that the minimum weight of 90% of the actual car capacity should be maintained. He advocated the same basis for sand hauled in box cars and open-top equipment. He presented briefs to show what the past earnings were and what future earnings would be under the proposed scale.

F. N. Hillard, of the Delaware & Hudson railroad, also subscribed to the rates proposed by Trunk Line carriers and described conditions on his lines. He called attention to the varied rates on different kinds of coal and said that no difficulty had been experienced in describing the coal. He inferred from this that as coal was described on basis of screen tests, there would be no difficulty of such description of sand.

The afternoon of the ninth day was taken up mostly in rebuttal of the carriers' previous testimony, and it was developed by witness A. Warsaw, of the Wedron Silica Co., that the carriers' contention that as silica sand had sold for from $8 to $18 per ton when pulverized, and 60c a ton unpulverized, the users of the pulverized material would install their own grinding facilities. As the users had not installed their own grinding equipment, he believed this evidence that they were only receiving a fair return on their investment. He further brought out the fact that there were no differences in transportation facilities or expedited services of silica when transported in closed equipment.

Conflicting Shippers' Summaries

Witness Riley took the stand again and at that time proposed that if the Commission did not see fit to adopt a commodity description, the segregation proposed by Mr. Souseman be adopted. This segregation classes sand in two groups, based on (1) chemical and (2) physical attributes. He did not advocate its adoption, but believed that "sand is sand."

E. R. Raumaker also submitted rebuttal exhibits of rate comparison in the districts involved.

S. S. Woods, president of the Pennsylvania Glass Sand Corp., refuted the statements of Prof. Fettke that his company's sand was unfit for concrete, in fact that it lacked uniformity or coarse particles. He submitted evidence to show that his sand had been successfully used and was being used in Maryland and West Virginia by the state highway commissions. It was at this time that he submitted the photographs previously referred to.

Witness Brooker took the stand and supported his rate proposal idea, maintaining the position that his proposal was basically sound and if adopted would net a reasonable return to the railroad, and that if the Column 16 scale were adopted it would mean ruination to many producers. He brought out that 16% of first class meant 5c per 100 lb. for the first 20 miles and 9c per 100 lb. for 100 miles; or a difference of 4c per 100 lb. or 80c per ton for a difference of 80 miles; in other words, a producer shipping 20 miles would pay $1 per ton, whereas a shipper from 20 to 100 miles would pay $1.80 per ton, so that a producing plant just outside the 21-mile limit would be ruined. Many of the railroad attorneys took exception to this interpretation of the so-called Column 16 or 16% of first class rate.

It was strikingly evident that the attorneys for the plaintiffs were far better equipped in their knowledge of the sand industry and its relation to traffic matters than were the attorneys for the railroads.

Analysis of Feldspar

IN the *Journal of the American Ceramic Society,* E. E. Pressler describes a method of feldspar analysis by which all the major oxides are determined on one sample. In the usual method of analysis of feldspar, the members of the insoluble group are determined on one sample and the alkali group on a second sample, thus duplicating the analytical procedure. The method described consists of decomposing the aluminous silicate with sodium carbonate at 850 deg. C. for two hours. The silica, alumina and calcium oxide are removed as usual and the magnesium precipitated by 8-hydroxyquinoline.

The separation of the alkalis is made by double precipitation with perchloric acid.

Wire Engineering

WITH THE NOVEMBER, 1930, issue of *Wire Engineering,* the John A. Roebling's Sons Co. inaugurated the publishing of a house organ that should be of interest to users of steel cable.

With the Roebling company's wealth of experience in the cable manufacturing field it has a world of interesting material from which to draw for such a publication.

Not only do the November and subsequent issues have articles that are of general interest, as they include histories of epoch-making bridges, etc., but they also include data that are valuable to operating men.

Motion Picture of Preparation and Uses of Asbestos

THE MINING, preparation and uses of asbestos are visualized in a one-reel educational motion picture film entitled "Asbestos, the Magic Fibre," prepared by the United States Bureau of Mines.

Asbestos is a silky, fibrous mineral found in seams or veins in metamorphic rocks. A close-up shows how the fibres of a piece of asbestos may be readily separated by hand.

The principal sources of asbestos on this continent are the mountains of Arizona and the area surrounding Asbestos, Can. A succession of scenes show the process of open-pit mining at Asbestos, Can. The rock is blasted and carefully combed by hand for the longest and finest fibres. The remaining rock is loaded by steam shovels into dump cars. The following scenes depict the breaking of the large boulders for the crusher by air drills, the drying of the crushed rock in rotary kiln dryers and the screening of the sand and rock from the fibre. Rollers weighing 6000 lb. crush the larger pieces to silken fibre.

The scene shifts to the factory, where 20,000,000 lb. of bagged fibre are shown in storage. The crushing of this fibre preparatory to the making of asbestos textiles is next depicted.

Textiles are made by first carding and spinning asbestos fibre into thread ready for the looms. The process of running the fibre through the carding machines is next pictured. The operation of the roving machines in which asbestos yarn is made is depicted and then the making of thread for weaving from the yarn. Next is shown the looms weaving asbestos cloth for many uses.

The making of various useful products from asbestos cloth is next depicted. These scenes show the making of automobile brake linings; asbestos tubing for making packings; fireproof roofing; packing and gaskets for steam engines, air brakes and automobiles.

Next is given a series of views showing the pulping of fibre for the manufacture of asbestos paper and the pressing of the condensed pulp into the form of paper. The making of pipe covering from the asbestos paper is visualized.

Other scenes show the combining of asbestos with magnesia for the making of insulating materials, and also the combining of asbestos and cement for the forming of a permanent fireproof material of many uses. The final scenes show the making of asbestos shingles.

Copies of this film are available for exhibition by schools, churches, clubs, civic and business organizations, miners' unions and others. Applications should be addressed to the United States Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Penn. No charge is made for the use of the film, but the exhibitor is asked to pay transportation charges.

Tampa Shipped More Phosphate in 1930 Than Ever Before

SHIPMENT of phosphate through Tampa, Fla., elevators established a new high record in 1930 with a total of 1,841,400 tons dispatched to foreign and coastal ports. Consequently, the port of Tampa probably will not reflect the drastic slump that has slowed up marine commerce.

The total of phosphate shipments from this port in 1930 is 154,000 tons greater than the record aggregate of 1929, and is 339,000 tons in excess of the amount shipped in 1928, which was a record up to that time.

Chief among the foreign ports to receive the 780,000 tons of phosphate shipped abroad from Tampa in 1930 in the order of their importance as markets for the chemical were: Hamburg, Rotterdam, Osaka, Genoa, Danzig and Tarragona, Spain. Phosphate exports from this port in the last five years have increased 40%, the gain being at a steady rate of about 40,000 tons a year.

Coastwise Shipments Have Increased

Coastwise shipments also have increased with the heaviest demand coming from Baltimore, Newark, Norfolk and Wilmington, N. C. The coastal service was improved last year, and now includes scheduled weekly runs to Boston in addition to New York, Philadelphia, Mobile and New Orleans, and sailings every other week to and from all Pacific Coast ports instead of the former monthly schedule.

Imports for 1930 practically were the same as those in the previous year. The total tonnage of all imports, exports and inbound and outbound coastwise shipping was slightly in excess of 3,000,000 tons. That indicates a business volume greater than that handled at any other port between Norfolk and New Orleans. Mobile comes second.

Shipping to Caribbean ports has expanded markedly, particularly to Kingston, San Juan, the Canal Zone and to Colombia, Venezuela and the Dutch West Indies. Semi-monthly service was inaugurated to those ports by the Aluminum line. This is in addition to scheduled service to the Leeward and Windward islands and Trinidad.

Forty Lines Maintain Regular Service

Regular service to and from Tampa was maintained during the year by 40 steamship lines to practically every important port in Europe, North America, northern South America and the River Plate territory, and the western coast of Africa and Japan. Tramp service was offered by 14 lines.

The purchase last summer of eight giant freighters by the Tampa Interocean Steamship Co. followed by the award of a 10-year mail contract to Spain gave Tampa assurance of continued schedules to one of its best lumber and phosphate markets, which will include a regular passenger run within three years.—*Wall Street Journal* (New York).

Joah Etchells Succeeds to Richard K. Meade's Practice

JOAH ETCHELLS, whose election to the presidency of Richard K. Meade and Co., was noted in ROCK PRODUCTS, December 20, 1930, graduated in civil engineering from the University of Pennsylvania. For two years he was assistant engineer of the Keystone Plaster Co.

During the fourteen years Mr. Etchells was associated with the late Richard K. Meade, he was engineer in charge of construction of the National Cement Co. in Montreal, Canada; later chief engineer and works plant manager for one year and a half. He designed the Keystone Portland Cement Co.'s plant at Bath, Penn., while with Mr. Meade as chief engineer. Also he designed and acted in advisory capacity in the building of the Republic Portland Cement Co.'s plant, San Antonio, Tex.

Joah Etchells

Mr. Etchells designed and superintended the construction of the recent addition to the Wabash Portland Cement Co.'s mill at Osborn, Ohio, doubling its capacity, as the company's chief engineer.

He was closely connected during the past years with Mr. Meade on his investigations, reports, valuations, appraisals and other professional work, including the designing and building of lime and chemical plants, as his chief engineer.

Following the death of Mr. Meade, Mr. Etchells was elected president of Richard K. Meade and Co., Inc., chemical and industrial engineers, 10 West Chase street, Baltimore, Md., and the business has been continued as before.

Toledo Sand and Gravel Concern Leases Waterfront Property

ONE of the most important developments in the builders' supply business in Toledo, Ohio, in many months was the announcement recently of the leasing of the river front property at the foot of Magnolia street by the Citizens' Builders' Supply and Fuel Co., from the Pennsylvania railroad, announced by J. L. Berry, president.

The company will begin the dismantling of old buildings on the site very soon and prepare to erect new yard offices, batching plant, and buildings there at an investment of more than $20,000.

The plant will probably be completed and ready for operation by March 1.

The company was formed five years ago and capitalized at $25,000 with yard at 2160 Starr avenue. It has enjoyed a rapid growth and its new move to establish a waterfront terminal with facilities for receiving shipments of sand, stone and cement by boat marks a big advance in its business.

The location was formerly leased by the DoVille Lake Sand and Gravel Co.

Included in the new layout will be a roadway to the dock facilities, new scales, batching plant, and complete retail facilities.

Sand will be delivered at the dock under contract from some of the local lake and river sand producers.

In addition to President Berry of the Citizens' company, C. A. Blinn is vice-president and M. A. Berry, secretary-treasurer. —*Toledo* (Ohio) *Times.*

Pulverized Silica Producer Sued by Employes

DAMAGES totaling $2,300,000 are asked by 46 complainants against a silica pulverizing company in New Jersey in state supreme court suits.

Twelve of the 46 suits are brought by relatives of former employes of the defendant, who have died, allegedly as the result of inhaling silica dust, while in the company's employ. The other 34 suits are brought by the former employes, who allege they suffered serious injuries from working in the company's plant.

According to the complainants' attorney they and the other complainants are suffering from a malady similar to groundglass poisoning, and are extremely susceptible to colds, which are likely to develop into pneumonia and prove fatal. The 46 complainants ask $50,000 each.

The company is engaged in pulverizing sand and other minerals, and, according to the plaintiffs, was aware the sand contained dangerous particles with a high silica content, and therefore was guilty of negligence.

The same attorney filed five similar suits in the Trenton federal court, in which two Pennsylvania producers of silica are defendants.—*Lakewood* (N. J.) *Times and Journal.*

Foreign Abstracts and Patent Review

Free Lime in Portland Cement. G. Haegermann designates the non-fixed portion of calcium oxide CaO in portland cement as free lime; it is frequently confused with calcium hydroxide $Ca(OH)_2$ which forms from the free lime and furthermore from combinations of clinker in the presence of water. The Emley method is

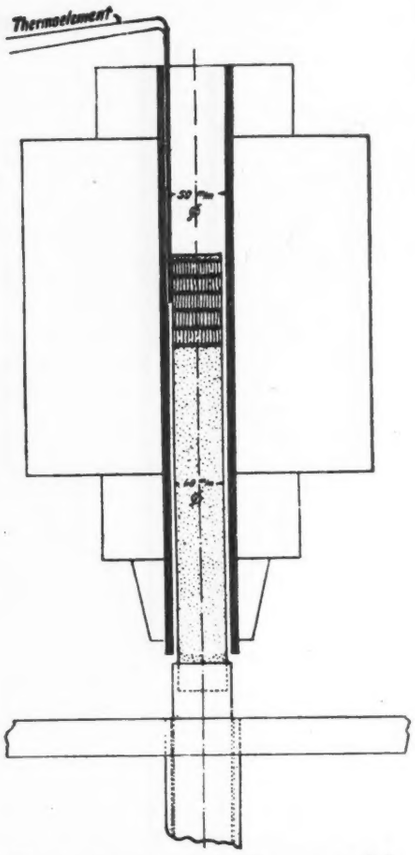


Fig. 1. Section of the Heraeus molybdenum resistance kiln for the burning of clinker

used here for the quantitative determination of the free lime. An absolute requirement for the success of an investigation is the absence of water, especially in the reagents. Clinker and cement in which the quantity of free lime must be determined, must *not* have been exposed to the influences of the atmospheres, otherwise the values obtained are too low. Therefore, the cements obtainable on the market are unsuitable for setting up relations between free lime and the volume consistency of portland cement.

The determination of the free lime and the ascertainment of the consistency in volume were made by means of the boiling test and the cold water test. The burning operations and the analytical work were done by Dr. Quast and E. de Sharengrad. With the exception of a sample, raw material which had been prepared for actual cement production was used. Cylindrical test specimens of 3.9 cm. diameter and 1.5 cm. height were formed with the addition of about 10% of water and then burned at various temperatures, or, better stated, burned at various burning stages, since not only the degree of the temperature, but also the length of time of the influence of the heat is of considerable importance in order to burn a clinker to a finish.

The kiln employed was a Heraeus molybdenum resistance kiln and the temperature was measured with thermo-elements. As shown in Fig. 1, the kiln was placed in a vertical position. The test specimens were placed upon a die of highly fireproof material and then brought into the zone of uniform temperature in such a way that they did not touch the kiln linings. Each test specimen laid between two platinum sheets in order to prevent a reaction of the individual specimens between each other. The period of testing was adjusted to suit the conditions of operating a rotary kiln. The heating from room temperature to 1000 deg. C. required 160 minutes, and further increases required 3 min. for each 50 deg. C. up to that temperature at which the temperature was maintained constant for 20 min. Burning was done at 1225, 1275, 1325, 1375, 1425 and 1475 deg. C. stages. The current was then turned off and the test specimens left in the kiln up to a kiln temperature of about 900 deg. C. The test specimens were then cooled in an exsiccator. The rapidity of cooling off from 900 deg. C. was about 100 deg. C. in seven min.

The test results are given in Table 1. Specimen B had a very high lime content. The test results indicate that the quantity of free lime of the various raw flours is quite different at the individual burning stages. The differences are conditioned by the lime content of the raw material, by the content in fluxing materials, such as iron oxide, magnesia, alkalies, fluorspar, etc.; by the state of form of the substances entering into reaction with the lime, as for example the silicic acid, which may be present first as silicic anhydride, as hydrate or in combination with alumina as silicate of alumina; and by the degree of preparation, that is, the rate of fineness and the care in mixing the synthetic materials.

The content of free lime in the clinker may be as much as 2.0%, according to the results of the boiling tests; yet, the boiling test was not passed by some specimens even when the lime content was much less, so that generally the boiling test should be passed with a free lime content of less than 1.0%. In one specimen the finish burn was obtained at 1275 deg. C., but the burning stage for finish burn fluctuates more than 200 deg. C. with the different raw flours when based upon the passing of the boiling test, and about 100 deg. C. when based upon the passing of the cold water test. The cold water test was passed even when there was nearly 4% free lime in the clinker.—*Zement* (1930) **19**, 42, pp. 982-984.

Gas-Fired Gypsum Plants. Walter Kirnich discusses gypsum burning, disadvantages of direct firing, advantages of gas firing, production of generator gas in modern rotary grate generators and their design, and the operating results of several gas-fired gypsum plants. With a correct adjustment of the burners and a high carbonic acid content in the flue gases, the fuel consumption is in part considerably less than in direct firing, and the output in gypsum frequently can be increased.—*Tonindustrie-Zeitung* (1930), **54**, Nos. 85, 87.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Plaster Board. A new way of protecting the edges of a plaster board is shown in the accompanying drawing. Two strips are trimmed from the top covering sheet and formed by rolls into troughs which enclose

TABLE 1. PER CENT. CONTENT IN FREE LIME OF THE TEST SPECIMENS A TO M BASED UPON THE BURNED MATERIAL

	A	B	C	D	E	F	G	H	J	K	L	M
	%	%	%	%	%	%	%	%	%	%	%	%
20 min. at 1225 deg. C.	12.65	.....	.....		9.60	5.51	9.95	.....	4.41	4.68	4.72	4.15
20 min. at 1275 deg. C.	5.96	.....	4.15		4.16	*1.76†	4.42	5.87	1.57	.....	*1.26	*2.10
20 min. at 1325 deg. C.	*3.78	15.01	*2.45	7.16	*1.92	*1.12†	*3.72	4.05	*0.69†	*2.86	*1.19†	*1.26†
20 min. at 1375 deg. C.	*2.04	11.05	*1.52	*3.52	*1.16†	*0.60†	*1.79†	*1.85†	*0.38†	*1.44†	*0.38†	*0.22†
20 min. at 1425 deg. C.	*1.60†	10.39	*0.24†	*2.62	*0.26†	*0.09†	*0.16†	.....	*0.03†	.....	*0.00†	*0.00†
20 min. at 1475 deg. C.	*1.45†	8.73	.....	*1.73	.....		.....	.....	.....	.....	.....	.....

*Passed the cold water test. †Passed the boiling test.

the edges of the board. The top and bottom covering sheets are put on outside of the strips on the edge.

The patent covers the method of making a board protected in this way as well as the board itself. The strips trimmed from the top sheet are guided downward to flat

A new way of protecting the edges of a plaster board

contact with the bottom sheet. The plaster is spread on the bottom sheet and the strips are folded to enclose the edges and then the trimmed top cover sheet is put on. The patent has been assigned to the American Gypsum Co., Port Clinton, Ohio.—*F. J. Griswold, U. S. Patent No.* 1,772,483.

Collecting Dust from Chimney Gases. The invention shown is an improvement on the form of dust collector which has a cylinder surrounding a stack or chimney. The gases are admitted to this cylinder tangentially so as to give them a whirling motion. The dust is thrown to the side of the cylinder by centrifugal force and the gases pass through an opening into the chimney. The improvement in this case is that of placing radial blades in the opening into the chimney to destroy the centrifugal force which would tend to hold fine particles in suspension. It also lessens the resistance to the upward passage of the gases in the chimney. The gases are forced through the opening into the chamber by the shape of the passage

FIG. 1.

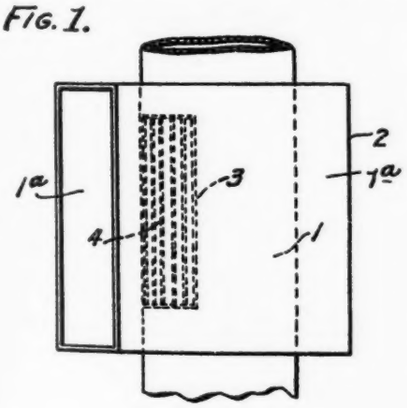
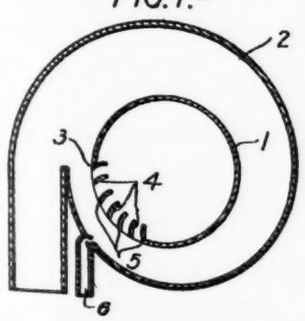


FIG. 1.a

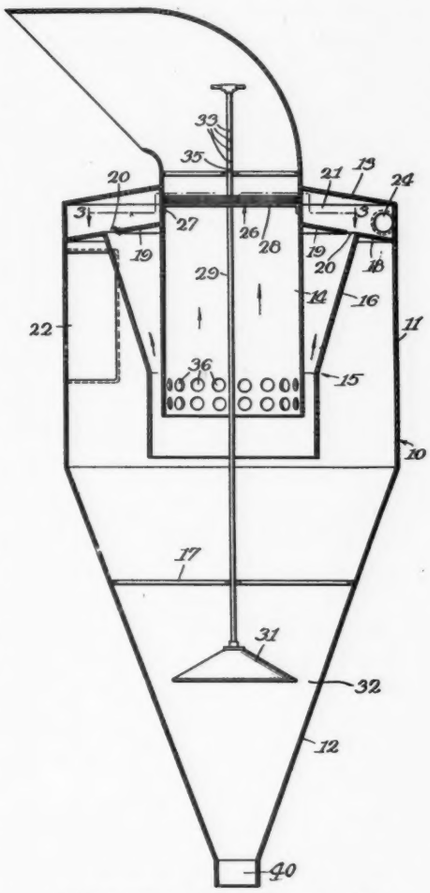


Improved device for collecting dust from chimney gases

between the cylinder and the chimney, which becomes smaller as it nears the opening.

The collected dust is removed through a small pipe shown in the plan at the right of the inlet.—*John Whitmore, U. S. Patent No.* 1,753,490.

Dust Collector with Return Circuit. In the device illustrated here there is a chamber at the top above, and not directly connected with, the main collector and the



Illustrating dust collector with return circuit

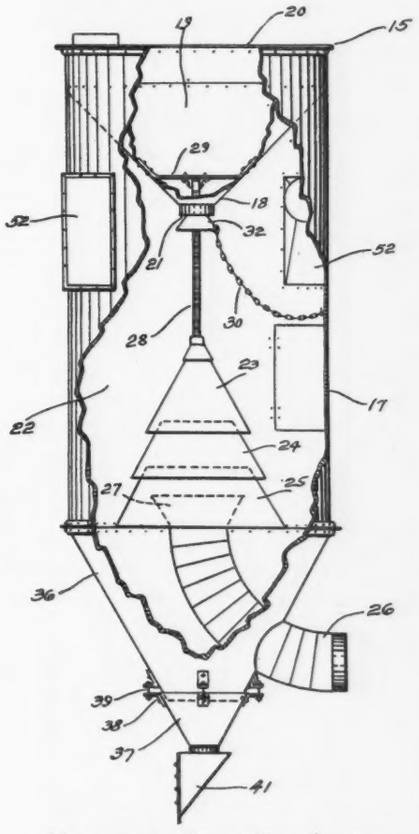
tangential inlet. It connects with the space between the outlet pipe and an inner casing by a circular slot. The bottom of the outlet pipe is inside this casing and provided with a number of holes.

In operation the dust laden air is given a whirl by being brought in through a tangential inlet and most of the dust is sent to the sides by centrifugal force and slides down to the usual outlet at the bottom. The air goes to the inlet pipe still retaining some whirling motion. This motion throws the dust out through the holes to the space between the pipe and the inner casing. It is lifted through the circular slot mentioned to the chamber above and from this it is carried through a loop to the inlet pipe to enter the main body of the collector again. The suction that does this is formed by the current in the pipe loop, the connection with the inlet pipe being made in such a way that a suction is formed by the passing of the air in the inlet pipe past this connection.

The flow through the device is regulated by valves in the outlet pipe and in the loop. The inventor says that by proper manipulation of these valves as much as 98 to 99% and even a higher percentage of the solids present has been removed.—*William G. Clark, U. S. Patent No.* 1,753,502.

Method of Air Separation. An air separator which does not employ centrifugal force has a series of cones and cone frustrums over which the material to be separated is cascaded. This series is placed over the suction pipe of an exhaust fan and the suction draws the finer particles up into the spaces between the cones while the coarser particles flow by to the receptacle below.

An illustration (not reproduced) shows how the separator is adapted to fine grinding. This discharge of the mill goes to an enclosed elevator and is lifted to the top of the separator. A cone valve in the separator provides for an even flow of the material to the separating cones. The fines drawn out between the cones pass through the suction fan to be caught in an ordinary cyclone and the coarse particles fall to the bottom of the separator, where they are held by a trap valve until their weight is sufficient to open it. All the points where dust might escape are piped to the separator. As the suction of the fan keeps a slight vacuum on the separator all the time, no dust can escape into the air of the plant.—*W. B. Prouty, U. S. Patent No.* 1,766,941.



Air separator has series of cones and cone frustrums over which the material cascades

Sand-Lime Brick Production and Shipments in December

THE following data are compiled from reports received direct from 19 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is one less than those furnishing statistics for the November estimate, published in the December 20 issue. The statistics below may be regarded as representative of the entire industry in the United States and Canada.

Reports for December indicate that production has decreased somewhat, as have shipments by rail. Shipments by truck, however, remain approximately the same. Stocks on hand show a slight decrease, while the reports indicate that there is an increase in unfilled orders.

Average Prices for December

Shipping point	Plant price	Delivered
Atlantic City, N. J.	$11.00	$15.00
Detroit, Mich.	13.00	15.50
Grand Rapids, Mich.	14.00	.....
Iona, N. J.	11.00	14.00
Jackson, Mich.	13.00	.....
Menominee, Mich.	.....	13.50
Milwaukee, Wis.	9.50	12.00
Minneapolis, Minn.	10.00	.....
Mishawaka, Ind.	11.00	.....
Pontiac, Mich.	11.00	13.00
Saginaw, Mich.	12.00	.....
Syracuse, N. Y.	14.00	18.00
Toronto, Can.	11.00	13.00*

*Less 5%.

The following statistics are compiled from data received direct from 19 producers of sand-lime brick in the United States and Canada:

Statistics for November and December

	†November	*December
Production	7,126,478	6,053,440
Shipments (rail)	3,044,388	1,845,820
Shipments (truck)	4,659,236	4,115,325
Stocks	12,729,954	11,060,226
Unfilled orders	8,183,000	8,625,000

†Twenty plants reporting. Incomplete, one plant not reporting production, one not reporting stocks on hand, and eight not reporting unfilled orders.

*Nineteen plants reporting. Incomplete, two plants not reporting stocks on hand and five not reporting unfilled orders.

Notes from Producers

Sand Lime Products Co., Detroit, Mich., has supplied 100,000 "Rockolite" sand-lime brick for the Grand Trunk passenger depot in Birmingham, Mich., and about 300,000 brick for the Detroit Edison Co.'s Connors Creek plant. They report that they have also had orders for brick in the past month from several Detroit schools and a couple of state hospital jobs outside of Detroit.

Walker and Frank Brick Co., Detroit, Mich., report that most of their shipments at present are small orders for sand-lime brick to patch up between joists and around fireplaces of small houses.

The twenty-seventh annual convention of the Sand-Lime Brick Association, is to be held at the Hotel Ansley, Atlanta, Ga., on February 3, 4 and 5.

The following has been taken from the U. S. Department of Commerce Technical News Bulletin of the Bureau of Standards, December, 1930, No. 164:

"About 75% of the 48 known manufacturers of sand-lime brick have expressed their desire to be listed as sources of supply of brick guaranteed to comply with federal specifications Nos. 504 and 505. Officers of the Sand-Lime Brick Association are co-operating with the bureau in an attempt to have the whole membership of the association represented on the bureau's willing-to-certify lists. The secretary of the American Face Brick Association, which maintains a research associate at the National Bureau of Standards for the investigation of efflorescence, absorption, and transverse compression strength of face brick, is taking steps which may lead to the establishment of a commercial standard for face brick, to which the certification plan will be applied."

Allen G. Walton, president of the Sand-Lime Brick Association, advises that since this was published, all but one member of the association has signed the "willing-to-certify" plan and only two other active producers outside the association have failed to sign this plan.

Phosphate Rock Census

THE BUREAU OF THE CENSUS announces that, according to data collected in the Census Mines and Quarries taken in 1930, the production of phosphate rock in the United States in 1929 by enterprises* engaged in the mining of this rock amounted to 3,828,623 long tons, valued at $12,943,857 (at f.o.b. mine prices). These figures represent increases of 92.5% and 25.8%, respectively, as compared with 1,988,975 tons, valued at $10,292,990, reported for 1919.

Phosphate rock, a natural phosphate of lime, mined principally for use as fertilizer or as an ingredient of manufactured fertilizers, was reported as obtained in Florida, Idaho, Tennessee and Wyoming, by dredging, placer, open-cut and underground mining.

The statistics for 1929, with comparative figures for 1919, are given in the following table:

SUMMARY OF THE PHOSPHATE ROCK INDUSTRY—1929 AND 1919

	1929	1919	Per cent. of increase or decrease †
Number of enterprises	25	48	
Salaried employes and wage earners:			
Salaried employes	271	374	—27.5
Wage earners (average for the year)	3,170	4,373	—27.5
Principal expenses:			
Salaries	$617,527	$761,423	—18.9
Wages	$2,123,393	$3,900,966	—19.9
Supplies, fuel and purchased electric current	$3,492,606	$3,980,802	—12.3
Contract work	$20,936	$163,696	—87.2
Horsepower rating of power equipment:			
Aggregate	133,122	49,639	168.2
Per wage earner	42.0	11.4	.....
Phosphate rock mined:			
Tonnage	3,828,623	1,988,975	92.5
Value	$12,943,857	$10,292,990	25.8
Ratio (per cent.) of wages to value of phosphate rock	24.1	37.9	.....
Ratio (per cent.) of supplies, fuel, and purchased electric current to value of phosphate rock	27.0	38.7	.....
Expenditures for development (included in principal expenses)	$153,514	$353,237	.....

* Does not include enterprises reporting a value of product under $2,500.
† Per cent. not computed when base is less than 100.

New Phosphate Rock Deposit in Montana Opened

A MINE is being opened up on the William Anderson ranch, 22 miles northeast of Deer Lodge, Mont., which promises to be one of the largest developments in the mining world of recent times for that district. A high grade of phosphate rock is being mined by a concern known as the Montana Phosphate Products Co.

The mine, owned by Mr. Anderson and operated by the Montana Phosphate Products Co., is working on a 100,000-ton order for the Consolidated Mining and Smelting Co. of Trail, British Columbia, and 100 tons a day are being shipped.

Mr. Anderson, vice-president and extensive stockholder in the operating company, located the vein of phosphate on his ranch after two years' diligent search. Working into the mountain, Mr. Anderson ran on the vein about 60 ft. from the surface and found it from 4 to 5 ft. thick with a 30% dip. From this point the ore is stoped out. Three tunnels are now being operated with 16 miners to fill the Canadian contract. The ore extends for a distance of two miles or more on the Anderson property, according to Mr. Anderson, and an estimate made by engineers places the total phosphate available from the present level at 2,000,000 tons. No exploration to ascertain the depth of the vein has been made. Assays of this rock give returns of 77% B.P.L.

To produce the 100 tons of ore per day 16 men are employed in the mine, while three trucks operate 24 hours a day, carting the ore to the cars. Between 10 and 15 men are employed erecting buildings, ore bins, cutting stulls, etc.

The 100,000-ton contract for the Trail, B. C., smelter, will be completed by January 1, 1931, when the new $10,000,000 smelter of the Consolidated Mines company will be completed and start operations, using 100 tons a day of the Powell county shipment. The phosphate product after treatment by the smelter, will be known as "Treble Super Phosphate" and sell for from $35 to $45 per ton, said Mr. Anderson.—*Billings* (Mont.) *Times.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Central and Truck Mixed Concrete for Pavements and Highways

Report Presented by Committee on This Subject at St. Louis Convention of the American Road Builders' Association

READY-MIXED CONCRETE, with a production last year in excess of 7,000,000 cu. yd., is a method of construction which has come to stay. The term "ready-mixed concrete" as used in this report is taken to mean portland cement concrete mixed at a central mixing plant and hauled to the job; or the aggregates proportioned at the plant and the product mixed at the plant in transit or at the job in a truck mixer.

After reviewing the data on hand, this committee has arrived at the following conclusions:

1—Ready-mixed concrete, manufactured under proper supervision, is acceptable for all types of concrete construction.

2—The ready-mixed concrete plant should be equipped with weighing devices, meeting the specifications of the American Road Builders' Association for weighing devices for concrete aggregates, and as used by various state highway departments.

3—For low slump concrete the nonagitating type of truck is satisfactory as hauling equipment under proper supervision, and gradation of aggregates.

4—Specially designed water-tight bodies with rounded corners should be required when open type dump bodies are used.

5—The so-called agitator type of bodies have proven satisfactory for hauling concrete of any slump under proper supervision and gradation of aggregates.

6—Satisfactory concrete can be secured by truck mixers provided proper supervision and gradation of aggregates is exercised.

7—The use of central mixing plants, the transportation of mixed concrete and the use of truck mixers may be permitted provided there is no segregation of material when the concrete is deposited on the subgrade.

8—The concrete may be hauled not to exceed one hour, except by special permission of the engineer, and must reach the subgrade in such plastic and workable condition that the slump, on the job, is within the limits specified.

9—Any concrete which is not plastic and workable when it reaches the subgrade should be rejected.

10—It may be pointed out that there is generally a change of slump with the elapse of time after mixing. This should be taken into consideration in arriving at a suitable water-cement ratio applicable to each job. In this respect complete co-operation is necessary between the engineer and the operator.

11—The methods of transferring the product from the hauling unit and depositing same on the subgrade have been discussed as well as the protection of subgrades requiring such protection.

12—Where no mesh reinforcing is used, it is suggested that light steel channels be used for truck runways. These channels should be in sections preferably 5 ft. in length. Where reinforcing mesh is used, portable swivel type conveyors to take care of at least 20 ft. of subgrade could be utilized.

13—The use of bulk cement frequently presents an economic and, from an engineering standpoint, thoroughly statisfactory operation. However, the decision in this matter should be reached after an investigation as to the adaptability of the project to be constructed to such a method.

14—Engineers, in permitting the use of ready-mixed concrete, should at all times satisfy themselves that the operator is sufficiently equipped both from the standpoint of personnel and mechanical equipment to produce and deliver the product in sufficient quantity and of a quality which is acceptable.

In order to comply with the many requests being received from engineers, contractors and manufacturers of equipment, the American Road Builders' Association has conducted a survey to determine the extent to which ready-mixed concrete was being permitted in paving specifications, the results being obtained, along what lines improvement was needed, and in cases where the product was not permitted under the specifications, the principal objections to its use.

Accordingly a questionnaire was prepared containing the following questions:

1—Do you permit under your specifications the use of concrete mixed in a central mixing plant?

2—Do you require the product to be agitated en route from the mixer to the job?

3—What is the maximum time allowed between mixing and placing?

4—Do you permit, under your specifications, the use of concrete mixed in transit?

5—Do you use the slump test for concrete?

6—If so, what is the maximum slump permitted for concrete for one course concrete paving? For concrete base?

7—In case of reinforced concrete pavements, how is reinforcement handled so as to permit delivery units to back up along the grade to the point where concrete is to be deposited?

8—Do you experience difficulty with trucks cutting up subgrades?

9—If so, how is this overcome?

10—From your experience with central- or truck-mixed concrete, on what methods of construction or equipment are improvements needed?

11—If you do not permit the use of central- or truck-mixed concrete, what are your principal objections to same?

This questionnaire was then sent to all state highway departments and to 102 cities selected at random over the country, usually two to each state.

That the use of this product is of unusual interest is evidenced by the fact that out of 150 questionnaires sent out, 103 replies were received, without a follow-up letter. Forty-two of the 48 states replied and 61 of the 102 cities.

In many instances these replies were accompanied by a letter stating that the engineer was in no way familiar with the use of ready-mixed concrete, and requesting general information on same.

From the replies received, it is evident that, in the majority of cases, the engineer has failed to keep up with the developments of the ready-mixed concrete industry. In general the engineer thinks of ready-mixed concrete in accordance with the experiences of 1918-1921. He views it as a product reaching the job in a segregated condition, at infrequent intervals, with no regard to

TABULATION OF REPLIES RECEIVED FROM STATES TO QUESTIONNAIRE ON CENTRAL AND TRANSIT MIXED CONCRETE

State	Is central mixing plant permitted?	Is product agitated en route?	Max. time between mixing and placing?	Is transit mixed concrete permitted?	Is slump test used?	Max. slump one course concrete?	Max. slump concrete base?	How is reinforcement handled?	Do trucks cut up subgrade?	How is this overcome?	Improvements needed on present equipment?	Objections to ready-mixed concrete?	Remarks
Arkansas	Under S.P.	No	30 min.	No	No			By limiting length of units	Yes	Hand labor			
California	Yes	No	40 min.	Yes	Yes	2 in.	2 in.	By distributing belt	No				
Colorado	Yes	No	40 min.	No	Yes	3 in.	4 in.		Yes	Hand labor	Water control		
Connecticut	Yes	Yes	60 min.	No	Yes						Water control		
Delaware	No			No	No							None	
Georgia	No experience												
Idaho	Under S.P.	No		No	Yes	2 in.							
Illinois	Yes	No	30 min.	No	Yes	2 in.	2 in.		Yes	Hand labor			
Indiana	Yes	No	30 min.	No	Yes	2 in.	2 in.	No mesh	Yes	Hand labor			
Iowa	Yes	No		No	Yes	1 in.		No mesh	Yes	Hand labor			
Kansas	No			No	Yes							Segregation—too much time between mixing and placing	
Kentucky	No			No	Yes	2 in.	2 in.	No mesh	Yes	Hand labor		Loss in event of sudden rain	
Louisiana	No			No	Yes							Hauling feature	
Maine	Yes	Yes	40 min.	No	Yes	3 in.		No mesh	Yes	Hand labor			
Massachusetts	No			Under S.P.	Yes	1 in.			No				
Michigan	Under S.P.	No	30 min.	No	Yes	1.5 in.	1.5 in.		Yes	Runways			(1)
Minnesota	Under S.P.			No									
Mississippi	No			No	Yes	2.5 in.	2.5 in.					Segregation Too much time between mixing and placing	
Missouri	Yes	No	60 min.	Yes	Yes	2 in.			No		(2)	(3)	
Montana	No experience												
Nebraska	Yes	No	30 min.	No	Yes	1.5 in.	1.5 in.		No		(4)		
Nevada	No experience												
New Hampshire	Yes	No	30 min.	No	Yes	3 in.			Yes	Hand labor			(5)
New Jersey	No			No								(6)	
New Mexico	Under S.P.	No	40 min.	No									
New York	No			No	No								
North Carolina	No			No									
North Dakota	Yes	No	30 min.	No	Yes								
Ohio	Under S.P.	No	30 min.	Under S.P.	Yes	2 in.	2 in.		Yes	Runways		Segregation—non-uniform mixing	
Oklahoma	No			No	Yes	1.5 in.	3 in.		Yes	Runways		(7)	
Oregon	No			No	Yes	1.5 in.						(8)	
Pennsylvania	Under S.P.	No	45 min.	Under S.P.	No			(9)	Yes	Limit weight		(10)	
Rhode Island	No			No	Yes	3.5 in.	4 in.					(11)	
South Carolina	No			No	Yes	1.5 in.	1.5 in.					(13)	
South Dakota	No			No	Yes	1.5 in.			Yes	Hand labor			
Tennessee	Under S.P.	Yes	60 min.	Under S.P.	Yes	3 in.	3 in.		Yes	Hand labor			
Vermont	No			No	Yes	3 in.							
Virginia	No			No									(14)
Washington	Yes	No	30 min.	Under S.P.	Yes	2 in.		By limiting lengths of units			(12)		
West Virginia	Yes	No	30 min.	No	Yes	2 in.	2 in.	Build half-width pavement					
Wisconsin	No			No	Yes	2 in.	2 in.						
Florida	Under S.P.	No	30 min.	No	Yes	1.25 in.	1.25 in.		Yes	Hand labor			

(1) Our objection to the use of central mixed concrete has been on account of the difficulty of getting the concrete out to the job and on to the subgrade with a consistency proper to produce good concrete and properly finished surface.

(2) Prevention of drying out in transit; positive control of gradation of coarse aggregate; uniformity of consistency; simplified plant construction to aid proper inspection.

(3) We find objection on concrete structure jobs with improper consistency. Segregation often objectionable. Transit mix equipment has helped to improve these conditions.

(4) Equipment to obtain absolute control of materials in order to maintain desired consistency and to avoid segregation en route.

(5) Will incorporate transit mixed concrete in specifications this winter.

(6) The trouble experienced is securing and maintaining the required consistency of the concrete and the opportunities available for reducing the quantity of cement required.

(7) We believe central mixed concrete requires higher water-cement ratio and objectionable on that account. Transit mix would be permitted if requested.

(8) No serious objection, but we have not had a job where central or transit mix seem to offer any economy or other advantage. Loss of the advantage of boom and bucket deposit, possibility of segregation, and uncertainty of control are principal objections.

(9) This is a problem that may limit the use of central and transit mix in highway construction.

(10) Difficulty in controlling mixing time, water content and mixing efficiency in transit mixers. In central mixing plants control of the time of haul and segregation.

(11) Lack of control of quantity of aggregates, including water.

(12) Transit mixers do not permit inspection of concrete for consistency before discharge.

(13) Segregation, irregularity in time, difficulty of complete inspection of full operation.

(14) Results obtained on one experimental job most satisfactory.

consistency, generally unsatisfactory and an operation over which he cannot exercise the proper control.

However, a check of these unsatisfactory conditions, when ready-mixed concrete is being produced from a modernly equipped plant, intelligently supervised, shows that they can and have been completely eliminated.

Attached to this report will be found a tabulation showing the replies from state highway departments and cities to the questionnaire submitted. An analysis of this tabulation discloses the following information:

Of the 42 states replying, 23 permit, under their specifications or under special provisions, the use of ready-mixed concrete; 16 do not, and 3 simply state that they have had no experience. Three, in the case of central mixing plants, required the product to be agitated en route. The maximum time allowed between mixing and placing varies from 30 to 60 min., with the average being 40 min. The slump test is used in 30 of the 42 states. The maximum slump for one-course concrete pavement reported is 3.5 in., the minimum 1 in., and the average 2 in. For concrete base 4 in. is the maximum, 1.25 in. the minimum, and 3 in. the average.

Of the 56 cities tabulated, 38 permit the use of ready-mixed concrete, 11 do not permit its use, and 7 state that they have had no experience with this method. The time allowed between mixing and placing varies from 10 to 60 min., with the average being approximately 45 min. The slump test is practically universally used, the average slump for one-course concrete being 2 in. and for concrete base 3 in.

In view of the data collected, and the experience of the members of the committee with ready-mixed concrete, there are three difficulties which must be given particular attention. These are as follows:

1—Damage to subgrade by hauling equipment.

2—Water control.

3—The transfer of the product from the hauling unit to the subgrade.

Damage to Subgrade

The damage to the subgrade by the hauling equipment presents a problem entirely different from that encountered when a mobile paver is used on the grade. Trucks hauling aggregates to a paver will, of

TABULATION OF REPLIES RECEIVED FROM CITIES TO QUESTIONNAIRE ON CENTRAL AND TRANSIT MIXED CONCRETE

City	Is central mixing plant permitted?	Is product agitated en route?	Max. time between mixing and placing?	Is transit mixed concrete permitted?	Is slump test used?	Max. slump one course concrete?	Max. slump concrete base?	How is reinforcement handled?	Do trucks cut up subgrade?	How is this overcome?	Improvements needed on present equipment?	Objections to ready-mixed concrete?	Remarks
Akron, Ohio	Yes	No	30 min.	Yes	Yes	2 in.	2 in.		Yes	Runways	Water control timing device		
Aberdeen, S. D.	No			No					No			Segregation	
Birmingham, Ala.	Yes	No	60 min.	Yes	Yes	1.5 in.			Yes	Runways			
Baltimore, Md.	Yes	No	30 min.	No	Yes	2 in.							
Buffalo, N. Y.	Yes	Yes		Yes	Yes		3 in.						
Bethlehem, Penn.	No			No	Yes	2 in.							
Boise, Idaho	Yes	No	10 min.	No	No								
Boston, Mass.	Yes	Yes	20 min.	Yes	Yes						(1)		
Colo. Springs, Colo.	Yes	No	30 min.	Yes	No								
Cincinnati, Ohio	Yes	Yes		Yes	Yes	3 in.	3 in.				Water control		
Cleveland, Ohio	Yes	No	45 min.	Yes	Yes	4 in.			Yes	Runways	Water control		
Charleston, S. C.	Yes	No		No	No			(2)					
Cheyenne, Wyo.	Yes	Yes	10 min.	No	Yes	3 in.	3 in.	(3)	Yes	Runways			
Detroit, Mich.	No			No	Yes	3 in.	3 in.		Yes	Runways		(25)	
Denver, Colo.	Yes	Yes	45 min.	No	Yes	2.5 in.	2.5 in.		Yes	Hand labor			
Duluth, Minn.	No			No	Yes	1.5 in.			Yes	Runways			(4)
Durham, N. C.	Yes	No		No	Yes	6 in.			Yes	Hand labor	Truck bodies		
East Orange, N. J.	No experience												
Eugene, Ore.	No			No	Yes	2 in.			Yes	Has not been done		Cutting up subgrade	
Ft. Smith, Ark.	Yes	No	30 min.	Yes	Yes	2 in.			Yes	Runways			
Flint, Mich.	Under S.P.			Under S.P.	Yes	3 in.			Yes	Limiting weight	Cement handling Grading of aggregates	(5)	
Ft. Worth, Tex.	Yes	No	30 min.	Yes	Yes	2 in.	3 in.						
Greensboro, N. C.	No			No	Yes	1.5 in.	1.5 in.		Yes	Runways		(6)	
Hartford, Conn.	No			No	Yes	2 in.	2 in.		Yes	Runways	(7)	(8)	
Hastings, Neb.	No			No	Yes				Yes			(9)	
High Point, N. C.	No experience												
Houston, Tex.	No			No	Yes	1 in.	3 in.		Yes	Runways			
Jacksonville, Fla.	Yes	No	45 min.	No	Yes	2 in.	2 in.		Yes	Runways	(10)		
Jackson, Miss.	Yes	No	20 min.	No	Yes	2.5 in.	2.5 in.					Segregation	
Los Angeles, Calif.	Yes	No	30 min.	No	Yes	3 in.	3 in.		Yes	Runways			
Laconia, N. H.	No experience												
Lynchburg, Va.	Yes	No	30 min.	Yes	No				Yes	Hand labor			
New Orleans, La.	Yes	No	45 min.	No	Yes	2.5 in.	2.5 in.		Yes	Hand labor			
Oak Park, Ill.	No			No	Yes	1 in.	1 in.		Yes	Runways		Segregation	
Norfolk, Va.	Yes	No	40 min.	No					Yes	Hand labor			
Omaha, Neb.	Under S.P.	No	45 min.	No	Yes	3 in.	4 in.	(11)	Yes	Hand labor	Method of delivery		
Ogden, Utah	Yes	No	30 min.	Under S.P.	Yes	4 in.	4 in.		Yes	Hand labor		Segregation	
Phoenix, Ariz.	No experience												
Pittsburgh, Penn.	Yes	No	40 min.	No	Yes	2 in.	4 in.		Yes	Hand labor	(12)		
Portland, Ore.	Yes	Yes		Yes	Yes	4 in.		Small unit	Yes	Hand labor			(13)
Peoria, Ill.	No			Yes	Yes	2.5 in.	2.5 in.		No		(14)		
Philadelphia, Penn.	Yes	No	50 min.	No	Yes	2 in.	2 in.	No mesh	No		Pneumatic-tired trucks		
Providence, R. I.	No experience												
Richmond, Va.	Under S.P.	Yes	45 min.	Under S.P.	Yes	3 in.	3 in.	(15)			(16)	(17)	
Reno, Nev.	No experience												
San Antonio, Tex.	Yes	No	30 min.	Yes	Yes	4 in.							
Seattle, Wash.	Yes	Yes		No	Yes	2 in.	3 in.	(18)	Yes	Runways	(19)		
St. Louis, Mo.	Under S.P.	No	45 min.	No	Yes	2 in.	2 in.	Small unit	Yes	Runways	(20)		
Shreveport, La.	Yes	No	15 min.	No					Yes	Runways			
Spartanburg, S. C.	No			No							Transferring product from hauling unit to grade		
Topeka, Kan.	Yes	No	60 min.	No	Yes	4.5 in.	4.5 in.		Yes	Runways	(21)		
Tucson, Ariz.	No experience												
Wilmington, Del.	Yes	Yes		No	Yes		4 in.		Yes	Hand labor	(22)		
Wichita, Kan.	Yes	No		No	No			No mesh	No			(23)	
Waukegan, Ill.	Yes	No	30 min.	No	Yes	3 in.	4 in.						
Waterville, Me.	Yes	No	40 min.	No	Yes	3 in.	3 in.	(24)					

(1) We have found that transit mixed concrete in a cylinder with baffle plates gives better satisfaction than the "U"-shaped or bathtub form mixer, owing to the small sized paddles on the revolving shaft.

(2) Longitudinal steel set first on the lower 2-in. layer of concrete. Wooden troughs to serve as tracks are then placed to carry the trucks over the 2-in. layer of concrete. Cross steel is then placed and covered.

(3) Runways provided over reinforcement in place.

(4) Considering at this time the changing of specifications to permit the use of ready mixed concrete.

(5) Planning to erect plant for own city work. Believe that cheaper concrete and better concrete can be produced and moving delays eliminated.

(6) Where haul is long, segregation occurs unless agitators are used.

(7) A better manner of transferring concrete from the truck to grade is needed. The use of a chute is objectionable because of the pulling apart of the concrete.

(8) In case of transit mixed concrete there is inadequate control of the water.

(9) The slump and water content can best be controlled where the product is mixed on the street.

(10) Present equipment, properly maintained and intelligently managed, will turn out excellent concrete. The weakest unit of the present equipment is the water control.

(11) Welded steel fabric is used in strips narrow enough for dump trucks with overhanging bodies to unload on the steel without backing upon it.

(12) Our experience shows a tendency of excess water and to exceed time limit.

(13) Service and equipment very good and splendid results being obtained.

(14) Transit mixers work fine, the only change required being the addition of a primer.

(15) This is one of the main reasons we do not use ready mixed concrete on a large scale.

(16) A means of depositing concrete away from the truck other than by the use of chutes. We do not allow use of chutes under any conditions.

(17) Lack of continuity, and difference in slump from central plant to arrival on job.

(18) Place steel and concrete over by means of side dump.

(19) Better water control. Consistency meters in mixer (being developed here), improvement in transportation equipment.

(20) Bins for storage so that segregation of aggregates is reduced to a minimum. Improvements should be developed in the form of trucks used.

(21) For lean mixtures separation of water from the concrete seems to be inevitable.

(22) This is the first year we have used central mixed concrete. The company is equipped with three agitator trucks and six dump trucks. The concrete from dump trucks is unsatisfactory due to segregation. Concrete from agitator trucks is very satisfactory.

(23) Uncertainty of delivery, broken down trucks and segregation.

(24) Double steel is used and a runway built for the trucks.

(25) Difficulty in obtaining low enough slump and a better method of transferring the concrete from the truck body to the grade.

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course, damage certain subgrades just as will ready-mixed concrete equipment; but in the case of a paver, the operator is given an opportunity to correct this damage immediately behind the mixer, and before the concrete is placed. However, in a ready-mixed concrete operation the concrete is dumped from the hauling unit direct to the grade and therefore frequently the opportunity to fill the ruts caused by the hauling unit is not afforded. Apparently, the most economical and satisfactory manner of correcting this condition is by the use of comparatively light channel irons. These irons are used as runways for the truck, and should be in sections preferably 5 ft. in length. By using as runways channels so constructed, the end section nearest the concrete can be removed, and brought forward, and thus eliminate moving ahead the entire runway.

Water control and the transfer of the product from the hauling unit to the grade were given serious consideration. In order to get a consensus of opinion on these matters from engineers in general, a questionnaire was mailed out to all state highway departments and to the same cities as previously referred to asking the following questions:

1—Could satisfactory results be obtained by the use of a conveyor for transferring the concrete from the hauling unit to the subgrade?

2—Could satisfactory results be obtained by the use of a chute for transferring the concrete from the hauling unit to the subgrade?

3—Could more satisfactory results be obtained by weighing the water rather than by the use of volumetric proportioning of same?

Thirty-five of the 48 state highway departments replied, and 47 cities.

The following tabulation shows the replies to this questionnaire:

STATE HIGHWAY DEPARTMENTS

	Question		
	No. 1	No. 2	No. 3
Arizona	.....	.....	Yes
Alabama	No	No	No
California	Yes	No	No
Georgia	No	No	Yes
Iowa	No	Yes	No
Idaho	No experience		
Indiana	.....	No	No
Illinois	No experience		
Kansas	No	No	Yes
Kentucky	Yes	Yes	Yes
Minnesota	Yes	No	No
Maryland	.....	No	No
Massachusetts	Yes	Yes	No
Mississippi	No experience		
Montana	Yes	No	No
Missouri	Yes	No	No
Michigan	Yes	No	Yes
New Hampshire	Yes	Yes	Yes
New Mexico	Yes	Yes	No
New York	Yes	Yes	Yes
Nevada	No experience		
Nebraska	No experience		
Oklahoma	Yes	Yes	Yes
Ohio	Yes	No	No
Oregon	No experience		
Rhode Island	Yes	Yes	No
Pennsylvania	Yes	No	Yes
South Dakota	Yes	No	No
South Carolina	Yes	No	No
Tennessee	Yes	No	No
Texas	Yes	No	No
Wyoming	No experience		
West Virginia	Yes	No	No
Washington	Yes	Yes	No
Wisconsin	Yes	No	No

CITIES

	Question		
	No. 1	No. 2	No. 3
Akron, Ohio	No	No	No
Bridgeport, Conn.	Yes	Yes	Yes
Buffalo, N. Y.	Yes	Yes	Yes
Birmingham, Ala.	Yes	Yes	Yes
Bethlehem, Penn.	Yes	No	.....
Colorado Springs, Colo.	Yes	No	No
Cleveland, Ohio	Yes	No	No
Cheyenne, Wyo.	No	Yes	Yes
Cincinnati, Ohio	Yes	No	No
Durham, N. C.	Yes	Yes	Yes
Duluth, Minn.	Yes	No	No
Ft. Smith, Ark.	Yes	No	No
Flint, Mich.	Yes	No	No
Ft. Worth, Tex.	Yes	No	.....
Greensboro, N. C.	Yes	Yes	No
Great Falls, Mont.	No	Yes	Yes
Grand Forks, N. D.	Yes	Yes	No
Hartford, Conn.	Yes	No	No
Hastings, Neb.	Yes	No	No
Indianapolis, Ind.	No	No	No
Jacksonville, Fla.	Yes	No	No
Los Angeles, Calif.	Yes	No	No
Laconia, N. H.	No	Yes	No
Madison, Wis.	Yes	No	Yes
Memphis, Tenn.	Yes	No	.....
Milwaukee, Wis.	Yes	No	No
Norfolk, Va.	.....	No	Yes
New Orleans, La.	Yes	No	.....
Omaha, Neb.	Yes	No	Yes
Ogden, Utah	Yes	Yes	Yes
Poughkeepsie, N. Y.	Yes	.....	No
Philadelphia, Penn.	No	No	No
Providence, R. I.	Yes	Yes	No
Portland, Maine	No	No	No
Portland, Ore.	Yes	Yes	No
Peoria, Ill.	.....	Yes	No
St. Louis, Mo.	No	No	No
Salt Lake City, Utah	Yes	Yes	No
Spartanburg, S. C.	Yes	No	No
Sioux City, Iowa	Yes	No	Yes
Seattle, Wash.	Yes	No	No
Tacoma, Wash.	No	No	No
Topeka, Kan.	.....	No	Yes
Tucson, Ariz.	No experience		
Wilmington, Del.	.....	.....	No
Wichita, Kan.	Yes	No	No
Waterville, Maine	Yes	No	No

It will be noted that of the 35 state highway departments replying, 21 reported that satisfactory results could be obtained by the use of a conveyor to distribute the concrete; 4 stated that satisfactory results could not be obtained, and 10 stated "no experience."

On the question relative to the delivery by chute of the material, 18 replied that satisfactory results could not be obtained, 9 replied that it was O. K. and 8 reported "no experience."

Whether or not more satisfactory results could be obtained by weighing the water than by the use of volumetric proportioning was covered as follows:

Negative	19
Affirmative	9
"No experience"	7
	35

A summary of the 47 replies from cities is as follows:

	Yes	No	Blank
Question No. 1	33	9	5
Question No. 2	14	30	3
Question No. 3	12	30	5

Delivery of Product

After studying the detailed replies, and a full discussion of the matter, the committee is of the opinion that the most practical solution of the problem lies in the development of a swivel-type conveyor which will place the product where it is needed on the grade. The development of such equipment will overcome the present difficulty encountered where mesh reinforcing is used, make possible the reshaping of the subgrade behind the hauling equipment, and eliminate the possibility of nonuniform density which may be caused by the concrete being dumped in a pile and pulled into place by hand labor.

Water Control

The problem of water control is not confined to ready-mixed concrete production, but is present in any concreting operation. If the majority of the opinions expressed in the replies to the questionnaire are to be considered, then there is no advantage in weighing the water.

The committee feels that the problem of water control is one from which the personal element cannot be eliminated, and the most satisfactory results can only be obtained through close co-operation between and rigid inspection by, both the operator and the user.

Bulk Cement

The use of bulk cement is an operation which is rapidly gaining favor in the concrete industry. It is an entirely satisfactory and economic measure if the work to be handled lends itself readily to an operation of this kind. However the use of bulk cement should only be decided upon after a careful investigation of the project to determine whether or not the layout is such that this would be of advantage.

Michigan Cement Products Producer Has Vision

A UNIQUE manufacturing enterprise developed in Owosso, Mich., during the last part of 1930 is that of ornamental concrete products. The concern is Concrete Products Co., owned by J. H. Howe, a native of Owosso, who took over the concrete block business of V. C. Wall, located at the corner of South Washington street and Corunna avenue last July.

The concern is continuing the manufacture of concrete blocks on the same basis as formerly but is developing the other lines as additional business. A display of these new products at the Hotel Owosso during the holiday season attracted considerable attention and revealed the extent of the enterprise.

The ornamental products include a complete line of garden furniture—pottery in full selection of colors for the porch and entrances, bird baths, sun-dials, seats for the lawns and gardens, and flags and stepping stones for the walks. The concern also "colorcretes" basement walls in various tints and textures, all waterproof.

The list of garden furniture, as the products are called, includes many items such as Grecian urn, Plymouth urn, Athenian urn, rustic bench with bark effect, arcadia, Colonial lawn seat, bird fountain, gazing globe, and several others. The concern also makes brick for ornamental posts as well as chimney blocks, steps, and similar lines. The company is working upon the development of a grave marker, made of materials that include crushed marble and white silica sand in addition to white cement. The combined materials are claimed to produce a very durable and lasting article. A marble luster is given to the product through the new process employed in its manufacture.

The rock fountain creations of the concern are especially attractive. Samples of the work may be seen at the Donovan miniature golf course, where one of the principal installations of the company was made after the start of operations on the new products.

Plans are being worked out to cover the state with the product by the establishment of dealers in the various towns and cities. Two salesmen will be put on the road early in the year, according to the plans. The concern will maintain both wholesale and retail departments, selling direct to the trade in the local territory. It will also continue general cement work contracting and landscaping.—*Owosso* (Mich.) *Argus-Press.*

New Haven, Conn., Cast-Stone Producers Form a Million Dollar Merger

THE Decorative Stone Co. and the Economy Concrete Co., both of New Haven, Conn., producers of concrete cast-stone, have been merged into a single concern with combined resources estimated at about $1,000,000.

This merger brings to an end a rivalry which existed for several years between these companies in the stone manufacturing business, and was effected in the belief that combined, the business could be built up on a much larger scale and that the business could be extended to further fields. The new organization will be one of the strongest of its kind in this section of the country.

The two plants represent manufacturing space of about 225,000 sq. ft., two railroad sidings with a capacity of 16 cars. The new concern will have offices in New Haven, New York, and representatives in Trenton, N. J., Philadelphia, Baltimore, Pittsburgh, Eastern New York, Connecticut and Massachusetts.

The merger was effective on January 1, 1931. The officers are: L. A. Falco, president; C. Van de Bogart, treasurer and chairman of the board of directors; J. R. MacKay, vice-president; H. R. Allen, vice-president, and James E. Wheeler, secretary. The board of directors will consist of the officers listed above, and E. M. Falco, M. A. Falco, and William Lloyd Kitchel.

The consolidation brings together two concerns specializing in all types of buildings, with more than 20 draftsmen and engineers, a large staff of architectural sculptors, and two modern pattern departments, which are said to be the last word in equipment. The Dextone company privately owns a marble quarry and this furnishes an adequate and continuous supply of aggregate, uniformly tested for hardness, color, grading and size.

The casting department is elaborately equipped with mechanical devices which insure uniformity of production. In the finishing and cutting department the best stone cutters in the section, all of long experience, carve with pneumatic chisels as well as by hand. Again in the finishing departments one finds the most modern of mechanical equipment. The new company will maintain planning and production departments, with service men at all times ready to assist job superintendents and contractors. The new organization will probably specialize in the use of Dextone, a composition which is easily worked, can be colored to suit any purpose and which is said to possess the hardness of natural stone.

This material has been used in many large university buildings and in ecclesiastical structures as well as in banks and public buildings. This will probably be one of the feature products of the new organization, which feels with increased equipment, capital and staffs it will be the better able to serve its customers of the past and gain many in extended fields.—*New Haven* (Conn.) *Journal-Courier.*

A New Synthetic Stone

PATENTS have been applied for covering a new artificial stone to be known as "Rostone," the invention of three Indiana men. The nature of the material is not much disclosed in the publicity material sent out about it, which is mostly devoted to the possibilities of a silicon chemistry similar to carbon chemistry (or organic chemistry).

As every one who has studied or dabbled in chemistry knows, the combinations of the element carbon are almost infinite and a vast literature is already available on these. Various authorities in the rock products industry, P. H. Bates, of the Bureau of Standards, particularly, have pointed out that the element silicon is a close second to carbon in chemical possibilities, but silicon has been little studied.

To quote now from the publicity material on "Rostone": "The laws governing the action of silicon and the scientific art of this field are scarcely known as compared to those of carbon. True, some of its products, such as pottery, brick, carborundum, slates and precious stones, are well known, but the underlying chemistry of these is hardly known at all. The progress of civilization has been such that necessity has not dictated a study of this field. Today scientists are devoting more study to this field and all it involves than has been done in all of the last century.

"Experimentation in silicon technology was begun about seven years ago by Prof. Harry C. Peffer, head of the School of Chemical Engineering at Purdue University, and Richard L. Harrison, a chemical engineer, in co-operation with David E. Ross of Lafayette, Ind. Their work resulted in the discovery of this new product, Rostone.

"Chemically, the material resembles anorthite, one of the feldspar group, yet it possesses many of the favorable features characteristic of synthetic products. An enumeration of these features is given as follows: (*a*) The material is close grained and in forming readily takes the finest impressions; (*b*) it is lighter than natural building stones and ordinary concrete; (*c*) it is tough and will dent before breaking if struck with a hard object, thus demonstrating its high resistance to impact, as compared with other materials of its class; (*d*) it is highly resistant to the action of ordinary chemical reagents as well as to other tests which are destructive to natural and artificial building materials; (*e*) it is highly fire-resisting; (*f*) it has an average compressive strength which is higher than for most natural and artificial building materials; (*g*) it can readily be cut, carved or sawed, and takes a polish like natural building stones; (*h*) it can be colored in the process of forming and retains such colors without change, thus lending itself to highly decorative effects; (*i*) it unites firmly with metal or other substances, thus readily permitting the use of reinforcing, or the use of aggregates, which it will securely bond.

"With these qualifications in mind it is easy to believe that the new material will find wide application for structural, ornamental and decorative stone work of many types. It is formed of natural argillaceous materials found in abundance in many sections of this country. The process of manufacture, amazingly simple and economical, consists almost entirely in the scientific control of conditions. Like other contributions of chemistry to the industrial world, its bid for success is based entirely on superiority to existing products and usefulness to mankind."

Seattle, Wash., Ready-Mix Concrete Business Successful

FROM SALES in 1925 that totaled 13,000 cu. yd. to sales in 1930 aggregating 130,000 cu. yd. tells part of the story of success that has been achieved by the Pioneer Sand and Gravel Co. in the manufacture and marketing of Tru-mix concrete.

"Commercial pre-mixed concrete was virtually an unknown commodity at the time we started," D. L. Williams, vice-president and general manager of the Pioneer Sand and Gravel Co., declares, "and much pioneering was necessary.

"The development that this company shouldered in the early days has been a guidance to many other businesses in the northwest and elsewhere. The development of suitable equipment has required financial resources and ingenuity," Mr. Williams said.

"We have not only kept pace with this rapidly-growing industry, but have probably contributed more to its development than any other institution in the country."

Mr. Williams attributes the phenomenal growth in the demand for Tru-mix to conscientious progressive policies instituted at the inception of the commercial pre-mixed concrete business six years ago.

One of the most encouraging facts in connection with this growth, Mr. Williams added, is the class of business which has made up the tonnage increase.

Among the important Seattle building projects which have used Tru-mix are the Exchange building, Olympic hotel addition, the W. Garfield street bridge, Washington Athletic club, Spokane street bridge, Northern Life tower, the Argo crossing, Diamond Cement plant, the University of Washington group, federal immigration station, Fraser-Paterson and the Benjamin Franklin hotel. —*Seattle* (Wash.) *Star.*

Virginia Quarry Installs Paving Materials Pre-Mix Plant

CLOSING OF CONTRACTS for the construction at Marion, Va., of a four-unit steel plant for the production of pre-mixed paving materials was announced December 29 by W. F. Culbert and Sons, operators of a large local limestone quarry.

Contract for the construction of the plant has been let to the Coatesville Boiler Works of Philadelphia, Penn. Under terms of the contract construction of the plant must be completed by April 1, 1931, and at that time the company will begin producing pre-mixed paving materials.

Plans for the plant, announced several months ago, have been somewhat changed. Instead of confining itself solely to the production of pre-mixed asphalt for paving uses the company has ordered additional equipment which makes possible the production of all kinds of bituminous paving materials.

These, under present plans for operation, will be supplied Virginia, West Virginia, Tennessee and North Carolina.

Products of the company will be sold under the trade name of "Marionite Bitulithic Pavement."

The plant will have a producing capacity of 6000 cu. yd. of paving material per day. Limestone, the bulk material used, will be supplied from the present quarry of W. F. Culbert and Sons, who now have in storage more than 40,000 tons of prepared stone.

The four-unit paving material plant will be erected adjoining the quarry crushing plant. When production of paving materials is begun enlargements of the crushing plant and of the quarry working force are anticipated.

The four units of the new plant will be constructed entirely of steel and concrete and with the latest engineering production facilities.—*Bristol* (Tenn.) *Herald-Courier.*

One Iowa Gravel Company Had Big Year—1930

THE PAST YEAR was a record one for the Ideal Sand and Gravel Co., which shipped out a total of 8000 carloads of sand and gravel in 1930.

The plant supplied the coarse and fine aggregate for 70 miles of pavement in Iowa, including special paving projects in Charles City and Osage. Considerable material was supplied the Hormel packing plant at Austin, Minn., for an addition to the filtering plant and other construction projects. The local plant also shipped material for the erection of a new high school building in Algona. It provided the aggregate for numerous building projects in Marshalltown and shipped the sand and gravel used in the expansion program of the Oliver Farm Equipment company at Charles City.

The Mason City plant supplied the sand and gravel for the paving of the 17 miles of Freeborn county highway that connected the two far-flung pavement projects of Iowa and Minnesota, closing the gap for the celebration of the completion of the Jefferson highway across two states.

The plan, which is headed by Grant McGowan, uses the latest type of machinery to dig the sand and gravel from the vast stores left by glacial action.

To prepare its product for market the plant used more water than was consumed by the entire city of Mason City during the same period. The water is pumped from the McGowan pond through a 12-in. pipeline by four electrical pumps.

The company looks forward to a good business in 1931, when Iowa will continue the expansion of her road building program. —*Mason City* (Ia.) *Gazette.*

New Quarry Development at Alpena, Mich., Rumored

OFFICIALS of the Thunder Bay Quarries Co., which recently announced plans of developing extensive holdings of the Jefferson Land Co., are now located in a temporary office at 1541 Ford avenue in the former Oliver residence, Alpena, Mich.

Hundreds of men have visited the office in search of jobs. Names of applicants were taken and will be considered later after a survey of data compiled at the registration bureau in the city hall, where unemployed men have registered to the number of more than 500.

C. R. Peregrine, secretary and treasurer of the company, is in charge of present operations, which are now moving ahead rapidly and point to extensive development of the stone land holdings in and adjacent to the northern part of Alpena.

Henry H. Hindshaw was interviewed by *The News* concerning reports that another company was about to develop limestone holdings near Bell. Mr. Hindshaw declared that no action by the company is under way at the present time.—*Alpena* (Mich.) *News.*

Abandoned Quarry Considered for City Reservoir

A PROPOSAL to buy the 27-acre water filled quarry of the National Lime and Stone Co. at the northeast edge of Bluffton, Ohio, and convert it into a reserve water-supply reservoir is being considered by the town administration body.

The large quarry forms a part of the 44-acre tract owned by the National Lime and Stone Co., which operates a chain of nine stone quarries in this district. Officials of the firm ordered the abandonment of their local property in the fall of 1929 when a $300,000 fire razed the plant building.

After the removal of machinery from the quarry the 27-acre pit was allowed to fill with water and today forms a reservoir over 30 ft. deep in places.—*Lima* (Ohio) *News.*

Southern Illinois Quarry Company Plans Expansion

AN INDUSTRY in Jersey county that promises to expand to large proportions in the immediate future is the quarry industry at Grafton, Ill.

The quarry is situated on land owned by Charles and Eugene Keller and has been operating for a number of months producing stone for work on the government deep water way construction being done by the Woods Brothers Co. At the present time there are 35 men employed, and this summer will be greatly augmented in the immediate future if other plans now being contemplated materialize.

Former Sheriff Charles H. Schlansker, who has had a large experience in such work, is to take charge of the limestone crushing for farm purposes.

The quarry has a frontage of one-half mile, and at present operations are being carried on along a stratum 80 to 90 ft. in height. The quarry is located on the Alton and Eastern railroad branch of the Illinois terminal and has access to large shipping facilities. A wagon road is being constructed from the city of Grafton to the quarry at the present time.

In the past quarrying activities in Grafton employed as many as 2000 men. Grafton stone was used for construction of bridge piers and much stone was shipped for building to St. Louis.—*Jerseyville* (Ill.) *Democrat.*

New Indiana Quarry Company

ARTICLES of incorporation were filed recently by The Hoosier Sand Stone Co., Bedford, Ind.

The incorporators are William Ingalls, Bedford; Samuel G. Fagan, Bloomington, and Henry Furst, Chicago, former president of the Furst-Kerber Cut Stone Co.

Officers are William Ingalls, president; Samuel G. Fagan, vice-president; Robert O. Martin, secretary-treasurer.

The company is capitalized at $50,000.

Quarry properties of the company are located in the southwest part of Lawrence county and the northwest part of Orange county. William Ingalls secured possession of the stone land some time ago and for the past year and a half has been operating a quarry there.

Thorough investigation has revealed an unusual pocket of highly colored sandstone with ledge depths ranging from 70 to 210 ft. The product is adaptable to both building construction and interior finish. Chemical analysis of the stone assures that it possesses rare quality.

Though widely different from the underground product of limestone quarried here, and consequently outside that competitive field, the sandstone product bids fair to offer competition to similar stone quarried in Ohio and other states.—*Bedford* (Ind.) *Times.*

W. W. Adams Promoted in Bureau of Mines

ANNOUNCEMENT of the appointment of Dr. O. E. Kiessling as chief economist of the Mineral Statistics Division and of W. W. Adams as chief statistician of the newly created demographical division in the United States Bureau of Mines, Department of Commerce, is made by Scott Turner, Director of the Bureau.

Dr. Kiessling succeeds Frank J. Katz, deceased, who had served as chief economist of the Mineral Statistics Division Economic Branch, for many years. Dr. Kiessling is from Jefferson, Wis. Since 1927 he has been a member of the staff of the Economic Branch of the Bureau. He is the author or joint author of numerous Bureau reports on the economic phases of the mineral industry, and has contributed many articles to the technical and trade press.

Dr. Kiessling holds B. A. and M. A. degrees from the University of Wisconsin, his thesis on the social and economic aspects of iron mining in Minnesota having been awarded special honors. From 1925 to 1927 he held the George Eastman fellowship at the Robert Brookings Graduate School, where he specialized in the economics of minerals. A doctor's degree was awarded him by this school in 1927 and his thesis "Co-operative Development of Oil Pools" was published by the American Institute of Mining and Metallurgical Engineers. He is a member of the American Statistical Association and of the American Institute of Mining and Metallurgical Engineers. For the past two years he has served the last named organization as secretary of the Production Control Committee and as a member of the Committee on Uses of Coal.

The Demographical Division, which will function as a part of the Bureau's Health and Safety Branch, will conduct statistical studies regarding the health, safety and welfare of persons employed in the mineral and related industries.

Mr. Adams was first appointed to the Government service from New Rochelle, N. Y. He became connected with the Bureau of Mines in 1911, but a few months after this branch of the federal service was organized. Until 1920 he served as assistant to the engineer in charge of the Bureau's statistical work relating to accidents in the mineral industries, and in that year was appointed chief of the section handling this phase of the Bureau's work.

He is the author of a series of statistical publications dealing with accidents in coal mines, metal mines, quarries, coke ovens, and metallurgical plants; of reports relating to the production of explosives in the United States; and of special reports prepared for the Bureau or for the mining press. This work is carried on in co-operation with mining companies, manufacturers of explosives, and the mining departments of the several states. In addition to its regular statistical studies covering the various branches of mining, the division of which Mr. Adams is the head also conducts the annual safety contests known as The National Safety Competition, and it co-operates with the National Crushed Stone Association and the National Sand and Gravel Association in the conduct of annual safety contests among their members.

Mr. Adams was educated in the public and private schools of Washington and New York. He was graduated from Georgetown University, receiving the degree of LL.B. and was admitted to the bar of the District Courts and the United States Supreme Court. He is a member of the American Statistical Association and the Coal Mining Institute of America, and is chairman of the committees on statistics of mines and quarries of the National Safety Council.

South Dakota State Cement Plant Had Busy Year

OFFICIALS of the South Dakota state cement plant are closing their books on the most successful manufacturing year in the institution's history, they said, in reviewing achievements of 1930. Although final figures are not available, approximate totals were made public by William F. Fowden, superintendent.

A total of 582,379 bbl. of finished cement was manufactured during 1930, he said, compared with 528,866 bbl. in 1929, or a gain of 53,513 bbl. Up to December 27, the date for which latest figures were available, about 556,790 bbl. of cement had been shipped from the state-owned factory, a gain of about 15,549 bbl. over shipments on the same date last year, said E. E. Hartley, sales manager.

The production gain is also indicated by figures for the stock on hand, Mr. Hartley said. This year there were about 89,163 bbl. of cement on hand, compared with 65,413 a year ago on the same date.

Among the achievements of 1930 at the cement plant was the turning back of $200,000 from the plant's profits into the cement plant interest and sinking fund in the state treasurer's office at Pierre. The $200,000 payment brought the total paid to $800,000, according to George Philip, chairman of the state cement plant commission.—*Sioux City* (Ia.) *Tribune.*

How Leakage Causes Misfires

THE United States Department of Commerce, Bureau of Mines, has issued technical paper No. 471, "How Leakage of Current from an Electric Shot-Firing Circuit Causes Misfires," written by L. C. Ilsley, A. B. Hooker and D. H. Tellers of the Bureau of Mines staff. The paper should be of interest to all quarry operators, and can be had for 5 cents by addressing the Superintendent of Documents at Washington, D. C.

Rapid Growth of a Montana Rancher's Gravel Operation

THE GRAVEL PIT at Cascade, Mont., was started in 1923. At that time three cars were loaded per day with three teams of horses and wheel scrapers. A platform was then built over the railroad track, teams were driven upon it and the gravel was dumped right into the cars. There was no machinery at this time to crush or separate the material.

In the following year a belt conveyor, which reached out into the pit, was put in and gravel was loaded on to the lower end of the belt with teams and fresnoes. This enabled the workers to load about five cars per day.

In 1925 a crushing plant to reduce gravel to smaller sizes was installed. A large Rumley engine was used to run the crusher. By that time it was getting to be a long pull for the horses to bring gravel up on to the "trap," or lower end of the belt, so a dragline, operated by steam, was installed. This machine enabled the workers to drag in gravel for a distance of three hundred feet all around the trap and increased the output to eight cars per day.

In 1928, another complete loading outfit was set up in order to supply the demand. That same year electricity was installed which cost about $90,000. With this type of power, and the new plant the output was increased to twelve cars a day. The sand was separated from the gravel and the gravel could be crushed to any size down to ¾-in. in diameter.

The year 1929 was the banner year. Two more new plants were set up and during the season 5249 carloads of gravel were loaded, as many as 50 cars being loaded per day. Most of this gravel was shipped to the Morony dam in Great Falls, which was built that year.

At the present time the machinery and equipment has a total value of about $150,000 and unloading docks have been built in Great Falls where all the materials are now being retailed.

The officers are: C. R. Tintinger, president and manager; L. E. Tintinger, assistant manager, and S. N. Tintinger, secretary-treasurer.—*Cascade* (Mont.) *Courier.*

Chemical Progress in the South

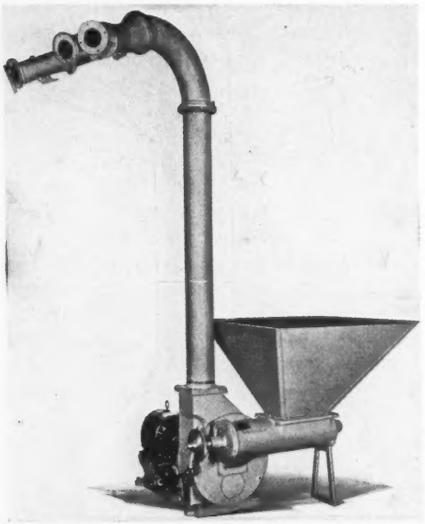
THE division of chemistry and chemical technology of the National Research Council has issued an excellent 282-page, illustrated book dealing with the chemical progress in the southern states. Chapters, by recognized authorities, deal with the various chemical problems that confront the various industries in the south and recent developments in that field in the district referred to.

The book is published by the Chemical Foundation, Inc., 654 Madison avenue, New York City.

New Machinery and Equipment

Stoker Pulverizes and Fires Automatically

THE Her-Born Engineering and Manufacturing Co., Sandusky, Ohio, has designed a machine, which it claims is built to meet every boiler firing condition, regardless of boiler size, type or kind of coal available. According to the manufacturer, this device, which is referred to as "Blomatic," prepares the coal by pulverizing into a form that provides complete combustion. A major portion of the pulverized coal blown into the furnace is burned in suspension, and the balance of heavier particles drops to the grates and form an incandescent fuel bed maintaining a hot flame for igniting the incoming pulverized coal.



Stoker for pulverizing coal

Firing is regulated and automatically controlled. Thermostatic switches governed by steam pressure, water temperature or building temperature, it is claimed, eliminate the possibility of excess or wasteful firing, as these switches start the motor only when needed and stop firing at peak load. When the coal feeder and automatic control are adjusted to the proper setting, the unit operates entirely without supervision, requiring no attention other than keeping the hopper supplied with coal, it is claimed.

The cast-iron combination pulverizer and blower frame is provided with inset steel pulverizing plates to minimize wear. These steel plates, it is stated, will indefinitely withstand the coal crushing and pulverizing, and are easily replaced when necessary.

The rotor is a combination blower and pulverizer. The centrifugal force of the hammer throwing the arms pulverizes the major portion of the coal, suitable for immediate ignition and burning in suspension upon expulsion from the tubes.

Fan blades of heavy steel plate withstand the wearing action and develop ample air volume and pressure from their peripheral speed to convey the pulverized coal up the conveying tubes and into the furnace. One electric motor, direct-connected to the combination pulverizer and blower shaft, drives the entire mechanism, and also provides the power for driving the adjustable ratchet for coal feeding.

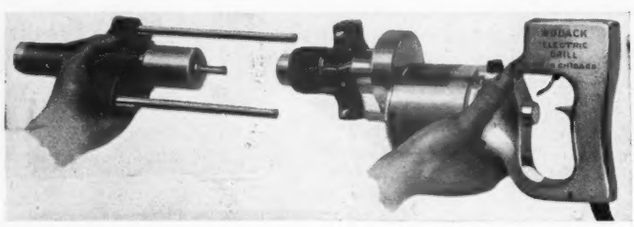
New Electric Hand Drill

A NEW TYPE of electric hand drill, which it is claimed bores with equal facility into wood, metal and masonry, is announced by the Wodack Electric Tool Corp., Chicago, Ill.

It is known as the Wodack "electric dual twist and hammer drill" and it is said that it will save time, money and labor for all work requiring the installation of expansion bolts or the drilling of holes up to ⅞-in. diameter in stone, concrete or brick.

According to the manufacturer, it takes only one minute to drill a 9/16-in. hole 3 in. deep in concrete with this drill, and in addition to operating as a hammer, it is a highly efficient rotary drill with correct speed and power to provide maximum drilling efficiency over the entire range of sizes from 0 in. to ⅜ in. in metal and ½ in. in wood.

It is also claimed to be an effective tool for grinding, scratching or buffing, permitting the operator to sharpen tools and bits on the job.



New type of electric hand drill for boring into wood, metal and masonry

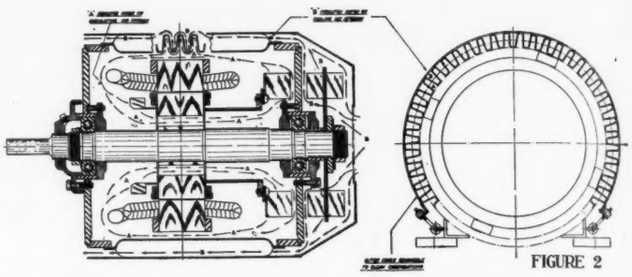


FIGURE 2

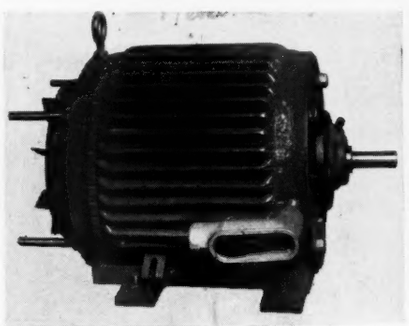
Illustrating the circulation of air currents for cooling the new induction motor

The tool is furnished in a metal carrying case with star drills and twist drills. Grinding, scratching and buffing wheels and bench stand can be furnished, as well as a convenient stand for use as an auxiliary drill press or bench grinder. The tool itself weighs 12 lb. and the entire kit 20 lb.

Fan Cooled Induction Motor

A TOTALLY enclosed, fan-cooled, induction motor with many new features has recently been announced by the Lincoln Electric Co., Cleveland, Ohio.

This new motor is of arc welded steel construction, with double-sealed ball bearings, and a removable cover which facilitates easy cleaning of the large radiating surface.



Fan-cooled induction motor with cover removed for cleaning radiating surface

According to the description, the large radiating surface is obtained by complete enclosure of the sides of the motor with a deeply corrugated sheet of corrosion resisting metal. This conducts the heat created within the motor to its outer radiating surface, which is constantly cooled by a continual draft of air passing over the radiating surface. The air imprisoned within the completely sealed frame is constantly circulated by a fan arc welded to the rotor. This fan drives the heated air within the motor to continuous contact with the large corrugated cooling surface. The outside air which drives the heat from the radiating surface

is forced over the exterior of the corrugated surface by a large arc welded fan attached to the motor shaft. The outside air is drawn in at one end of the motor and expelled at the other end.

This new motor has the same mounting dimensions as standard, open type, horizontal motors of equal rating, and it is manufactured in sizes from 1- to 50-hp.

New "Mule" Has Many Improved Features

A NEW AND IMPROVED "steel mule" is being manufactured by Marion Mules, Inc., Bucyrus, Ohio, the new unit recently acquired by the Marion Steel Body Co., Marion, Ohio, and formerly known as the R. J. W. Manufacturing Co.

According to the manufacturer, the new mule has many outstanding improvements in construction. For motive power either steel wheels, crawlers or pneumatic tire equipment may be used and interchanged in the field without difficulty. The crawler tracks are built and designed by the Marion company, with the driving sprocket operating on Timken bearings.

The power unit is a McCormick-Deering Model 10-20 industrial tractor unit, and transmission has four speeds forward and

Body of new "steel mule" has 4-cu. yd. capacity

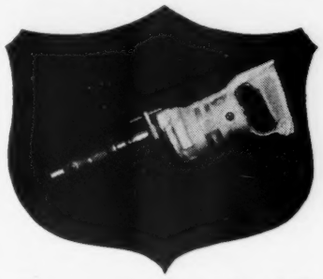
one reverse. The power unit is mounted complete in a heavily constructed chassis frame having 7-in. side channels. The tractor drive axle does not carry the load. An auxiliary or dead axle in the rear is fixed to the chassis supporting the load and driving wheels. The tractor drive axle connects with the dead axle through a gear reduction of 5 to 3, which, it is claimed, increases the power of the unit by 50%. The body has a capacity of 4 cu. yd., and this may be increased to 5 cu. yd. with sideboards.

Hammer-Attachment for Use with Electric Drill

THE MILWAUKEE ELECTRIC TOOL CORP., Milwaukee, Wis., has developed a new combination tool with which it is possible to hammer holes up to 1 in. diameter in concrete and brick, or, with the same machine, to drill holes up to 5/16 in. diameter in steel or wood.

The hammer attachment is constructed with only two moving parts, and is made to fit a specially-constructed full ball-bearing electric drill operating at high speed.

It is claimed that it will drill a ½-in. hole in the hardest concrete 2½ in. deep, a ¾-in. hole 1½ in. deep, or a 1-in. hole ¾ in. deep in one minute, and that owing to its light



Hammer-attachment for drill

weight, only 9½ lb., it is a very desirable tool when working on ladder or scaffold.

The Universal motor operates on either alternating current or direct current and can be made for 32, 110, 150 or 220 volts.

By substituting chisels for star drills the machine can be used in chiseling operations.

Construction Improvements Featured in New Tractor

MANY IMPORTANT improvements of construction are featured in the new Linn tractor, model 6-28-F, which is being manufactured by the Linn Manufacturing Corp., Morris, N. Y.

To give greater traction, each string of lags on the new model contains 29 units instead of 26, which it is claimed gives approximately 300 additional sq. in. of track surface in contact with the ground, a total minimum gripping surface of 1400 sq. in. instead of the former 1100.

Three track springs in clover leaf formation with a stop pin in the track adjusting bar relieve the constant tension of the track on the rear driving sprocket when driving ahead. When operated in reverse at high speed, the track springs come into play, keeping the track tight so that the lags do not buckle or catch in the rear frame.

The new model also has a fuel pump in place of a vacuum tank; a new and improved type of high speed reversing transmission which connects directly with the clutch; continuous side frame channel and improved steering wheel worm gears.

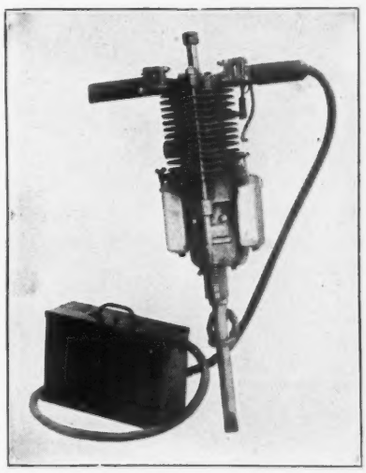
The new side-tipping elevating grader body doubles the dumping utility, it is claimed, and is equipped with an especially designed Commercial Shearing and Stamping Co. three-sleeve hoist, which dumps either to the right or left, but not to the rear, and provides a tipping angle optional with one's need. Sturdily built automatic down-folding gates on each side raise, lower and lock into position automatically. When flush with the body, they permit an early release of the pay load and a clear passage for boulders and large chunks of dirt. A rim board, which may be used on right or left side of the body, depending on the position of the grader, gives additional loading capacity. The loading capacity is 8 cu. yd.

The loading height of the new body is 5 ft. 7 in. There is no projection on the rear of the body to bump the grader when the tractor is fully loaded and is driven out from under the grader.

Another body is also equipped with the new automatic down-folding tail gate. This new type tail gate, state the manufacturers, has several very distinct advantages over the ordinary board. Controlled from the driver's seat by a lever, it saves a man the trouble of getting out to raise or to lower it. Immediately as the body lifts, the gate begins to open and the pay load begins to spill out, relieving the hoists of stress and strain. In dumping, when fully open, it provides an absolutely free passage for the discharge of boulders, large chunks of dirt and similar materials. And in hauling operations, it can be locked flush with the sides of the body for the carrying of dirt, snow and bulky loads or locked fully open for the transportation of girders and logs.

Gasoline-Powered Hammer

COMPLETE in a single unit, the Rodax gasoline hammer, manufactured by the Rodax Corp., Chicago, Ill., is used for tamping, concrete breaking, frost breaking, sheeting, driving, etc. The machine weighs but 87 lb., is readily portable and one man can



Portable gasoline-powered hammer

carry it about and operate it. It will take any standard 1⅛-in. tool.

Operation is started by a downward push on the plunger, and it operates all day on 2 gal. of gasoline and one pint of oil, according to its manufacturer. Gasoline and oil are contained in the tank which is bolted to the machine, so that there is no gas line or hose to break, freeze or clog.

Ignition is from a hot shot battery through a coil, which are contained in the ignition box and connected by cable to the spark plug on the machine.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.15	1.15	1.75		1.75	1.75
Buffalo, N. Y.		1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.80	1.00				
Leeds Jct., Scarboro, Me., and Milton, N. H. (b)		.50		1.75d	1.25	1.00c
Machias Junction, N. Y.	.75	.75	.75		.75	.75
Montoursville, Penn.	1.00	.75	.60	.40	.40	.40
Georgetown, D. C.	.55	.55	1.00	1.00	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.30	.20	.20	.35	.35	.40
Attica, Ind.			All sizes .75–.85			
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Columbus, Ohio	.75–1.00	.50– .75	.60– .75	.60– .75	.60– .75	.60– .75
Des Moines, Iowa	.40– .70	.40– .70	1.50–1.85	1.50–1.85	1.50–1.85	1.50–1.85
Dresden, Ohio		.60	.70– .80	.75	.75	.70
Eau Claire, Wis.	.50	.50	.65	1.00	1.00	
Elkhart Lake and Glenbeulah, Wis.	.45	.50	.50	.60	.50	.50
Grand Rapids, Mich.		.50	.70	.70	.70	.70
Greenville, Ohio	.50– .70	.40– .60	.50– .60	.50– .60	.50– .60	.50– .60
Hamilton, Ohio	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75
Hersey, Mich.		.40		.70	.70	.70
Humboldt, Iowa		.45			1.25	
Kalamazoo, Mich.		.45	.50	.60	.75	
Kansas City, Mo.	.70	.70	.80	1.50		
Mankato, Minn.	.55	.45	1.25	1.25	1.25	1.25
Mason City, Iowa	.50	.50	.85	1.25	1.25	1.25
Milwaukee, Wis.		.86	.86	.96	.96	.96
Minneapolis, Minn.	.25– .35	.25– .35	1.25–1.35	1.25–1.35	1.25–1.35	1.25–1.35
Oxford, Mich.	.25– .35	.20– .30	.30– .40	.55– .75	.55– .75	.60– .75
St. Louis, Mo.	.45– .75	.45– .85	.50– .90	.50– .90	.50– .75	.50–1.00
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.00	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.40					
Charleston, W. Va.	.70	1.25	1.25			
Eustis, Fla.		.40– .50				
Fort Worth, Tex.	1.00	1.00	1.25	1.25	1.25	1.25
Knoxville, Tenn.	.60–1.00	.80–1.00			1.20	1.20
Roseland, La.	.50	.50	1.10	.85	.85	
WESTERN:						
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.00*	1.00*
Pueblo, Colo.	.80	.60		1.20	1.20	1.15
San Gabriel, San Fernando Valleys, Cal. (a)	.80	.70	1.20	1.20	1.20	1.20
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*

*Cu. yd. ‡Delivered on job by truck. (a) Discount, 20c per ton if paid by 10th of month following delivery. (b) In carload lots. (c) Gravel, 2½-in. down to ¼-in. (d) ⅝-in. down to ¼-in.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.60	2.50	2.60			4.00	
Cheshire, Mass.						5.00	
Columbus, Ohio	1.35–1.50	1.25–1.50	2.00	1.25–1.35		3.50–4.50	
Dresden, Ohio	1.15–1.50	1.00–1.35	1.25–1.50	1.00–1.25	1.25		
Eau Claire, Wis.						2.00–3.00	
Elco, Ill.	Amorphous silica, 90-99½% thru 325 mesh, 10.00–60.00 per ton						
Kasota, Minn.							1.00
Mendota, Va.	Flint, 8.00–10.00 per ton						
Montoursville, Penn.				1.35–1.60			
New Lexington, Ohio	2.00	1.75					
Ohlton, Ohio	1.75	1.75		1.75	1.75	1.75	
Ottawa, Ill.						3.50	
Red Wing, Minn. (a)					1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	
South Vineland, N. J.	Dry white silica sand, per ton, 2.25						

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio		1.00
Eau Claire, Wis.	4.30	
Ohlton, Ohio	1.75	1.75
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass. (in carload lots)	5.00
Klondike, Mo.	2.00
Mendota, Va.	2.50–3.00
Ohlton, Ohio	2.40
Ottawa, Ill.	1.50
Red Wing, Minn.	1.50
South Vineland, N. J.	1.75
San Francisco, Calif.	4.00–5.00

Bank Run Sand and Gravel

Algonquin, Ill.¶ (½-in. and less)	.30
Buffalo, N. Y.—Sand, 1/10-in. down, 1.00; ¼-in. down, .85; gravel, all sizes	.75
Burnside, Conn. (sand, ¼-in. and less)	.75*
Fort Worth, Tex.¶ (2-in. and less down to ½-in. and less), for concrete, .70; for roads	.65
Gainesville, Tex.¶ (1-in.–1½-in. and less)	.55
Grand Rapids, Mich.¶ (1-in. and less)	.50
Hersey, Mich.¶ (1-in. and less)	.50
Kalamazoo, Mich.¶ (1½-in. and less)	.35
Mankato, Minn.†	.70
Winona, Minn.—Sand, any size	.50– .60
York, Penn.—Sand, 1/10-in. down, 1.10; ¼-in. and less	1.00

*Cu. yd. †Fine sand. 1/10-in. down. ¶Gravel.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.82½	3.30	
Atlanta, Ga.		†2.15–2.19*	3.46¶
Baltimore, Md.		†2.23–2.26*	3.53¶
Birmingham, Ala.		†1.81–1.85*	3.12¶
Boston, Mass.	.46¼	†1.85–1.88*	3.24¶
Buffalo, N. Y. (d)	.48	†1.92–1.95*	3.13–3.22¶
Cedar Rapids, Ia.		2.23*	
Charleston, S. C.		1.89†	3.26¶
Cheyenne, Wyo.	.60½	2.42	
Chicago, Ill.		†1.92–1.95*	3.22¶
Cincinnati, Ohio		2.14*	3.44¶
Cleveland, Ohio		†1.87–2.04*	3.17¶
Columbus, Ohio		†2.14–2.17*	3.44¶
Dallas, Texas		1.90*	3.49¶
Davenport, Iowa		2.14*	
Dayton, Ohio		2.14*	3.44¶
Denver, Colo.	.66¼	2.65	
Des Moines, Iowa	.48½	2.29*	
Detroit, Mich.		1.95*	3.25¶
Duluth, Minn.		2.04*	
Houston, Texas		2.00*	3.73¶
Indianapolis, Ind.	.54¾	1.99*	3.29¶
Jackson, Miss.		†2.24–2.29*	3.54¶
Jacksonville, Fla.		2.12†	3.46¶
Jersey City, N. J.		†2.10–2.13*	3.40¶
Kansas City, Mo.	.50½	2.02*	3.32¶
Los Angeles, Calif.	.57½	2.30	
Louisville, Ky.	.55½	†2.07–2.12*	3.37¶
Memphis, Tenn.		†2.03–2.29*	3.33¶
Milwaukee, Wis.		2.10*	3.40¶
Minneapolis, Minn.		2.27*	
Montreal, Que.		1.60‖	
New Orleans, La.		1.92†	3.22¶
New York, N. Y.	.50	†2.00–2.03*	3.30¶
Norfolk, Va.		1.97*	3.27¶
Oklahoma City, Okla.	.60¾	†2.43–2.46*	3.73¶
Omaha, Neb.	.55½	†2.22–2.36*	3.52¶
Peoria, Ill.		2.12*	
Pittsburgh, Penn.		†1.92–1.95*	3.22¶
Philadelphia, Penn.		†2.12–2.15*	3.42¶
Portland, Ore.		‡2.40–2.50	
Reno, Nev.		2.96‡	
Richmond, Va.		†2.29–2.32*	3.59¶
San Francisco, Calif.		2.24‡	
Savannah, Ga.		1.89†	3.20¶
St. Louis, Mo.	.48¾	†1.60–1.95*	2.90¶
St. Paul, Minn.		2.27*	
Seattle, Wash.		1.55–1.75	2.40c
Tampa, Fla.		2.00†	3.41¶
Toledo, Ohio		*2.10–2.20†	3.50¶
Topeka, Kan.	.55¼	2.21*	3.51¶
Tulsa, Okla.	.57½	†2.30–2.33*	3.60¶
Wheeling, W. Va.		†1.99–2.02*	3.29¶
Winston-Salem, N.C.		2.44*	3.74¶

Mill prices f.o.b. in carload lots, without bags, to contractors.

Bellingham, Wash.	2.25	
Bonner Springs, Kan.	1.85	3.15¶
Buffington, Ind.	1.70	
Concrete, Wash.	2.65	
Hannibal, Mo.	1.80	
Hudson, N. Y.	2.37†	3.27¶
Independence, Kan.	1.85	
Leeds, Ala.	1.70	
Limedale, Ind.	1.70	
Lime & Oswego, Ore.	2.50	
Nazareth, Penn.	2.15	
Northampton, Penn.	1.75	
Richard City, Tenn.	2.05	
Steelton, Minn.	1.85	
Toledo, Ohio	2.20	
Universal, Penn.	1.70	
Waco, Tex.	1.85	

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. ‡Subject to 2% cash discount. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‖Includes sales tax. (c) Quick-hardening "Velo," packed in paper bags. (d) Also †1.82 per barrel.

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.25–1.30	1.25–1.30	1.25–1.30	1.25–1.30	1.25–1.30	1.25–1.30
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Frederick, Md.	.50–1.00	1.50	1.15–1.50	1.15–1.50	1.05–1.25	1.05–1.25
Oriskany Falls and Munnsville, N. Y.	.50–1.00			1.00–1.35		
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Hillsville, Penn.	.85	1.35	1.35	1.35	1.35	1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75		1.75			
Afton, Mich.	.25	.25	.25		.65	1.50
Cypress, Ill.		1.00	1.00	.90	.90	.90
Dubuque, Iowa	1.10	1.10	1.10	1.10	1.10	
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	
Greencastle, Ind.	1.25	1.00	1.00	.90	.90	.90
Lannon, Wis.	.80	.80	.80	.80	.80	.80
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	
Stone City, Iowa	.75		1.10	1.00	1.00	1.00f
Toledo, Ohio (a)	1.10	1.60	1.60	1.60	1.60	1.60
Toronto, Canada (j)	2.10	2.10	2.00	2.00	2.00	2.00
Waukesha, Wis.		.90	.90	.90	.90	
SOUTHERN:						
Cartersville, Ga.	.75	1.15	1.15	1.00	.90	.90
Chico, Tex.	.50	1.30	1.30	1.25	1.20	1.00
El Paso, Tex. (k)	.50	1.25	1.25	1.00	1.00	1.00
Olive Hill, Ky.	.50	1.00	1.00	.90	.90	.90
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (h)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.10	1.25	1.25	1.25	1.00	
Rock Hill, St. Louis Co., Mo.	1.30–1.40	1.30–1.40	1.10–1.40	1.30–1.40	1.30–1.40	1.30–1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn.	1.20	1.60	1.45	1.35		1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	
Bridgeport, Chico and Knippa, Texas	2.25–2.50	1.80–2.00	1.50–1.60	1.30–1.40	1.20–1.30	1.00–1.25
Duluth, Minn.	1.00	2.25	1.75	1.65	1.35	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Farmington, Conn.	1.00	1.30	1.30	1.00		
New Britain, Plainville, Rocky Hill, Middlefield, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	
Northern New Jersey	1.55	2.30	2.10	1.70	1.70	
Richmond, Calif.	.75	1.00	1.00	1.00	1.00	
Toronto, Canada (j)	4.70	5.80	4.05			
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.50		1.60	1.60	1.40	
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40l
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.25	1.25	1.10	1.00	
Lohrville, Wis.—Granite	1.80	1.60		1.50	1.50	
Middlebrook, Mo.—Granite	3.00–3.50		2.00–2.25	2.00–2.25		1.25–3.00
San Gabriel and San Fernando Valleys, Calif. (Granite)		1.30	1.30	1.30		1.30
(Basalt)				.85		
Toccoa, Ga.—Granite	.50		1.25	1.30	1.20	1.20

(a) Screenings, including dust. (c) 1-in., 1.40. (d) 2-in., 1.30. (f) Rip rap. (g) Cu. yd. (h) Rip rap, 1.20–1.40 per ton. (j) Extra charge of 10c per ton for winter delivery; all prices less 5% for payment 15th following month. (k) Roofing gravel, per ton, 1.25. (l) Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem, Penn.	1.25–1.50	.50– .60	1.00	.60– .70	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.50	.60	1.00	.80–1.00	1.00–1.25	1.00–1.25	1.00–1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio		1.05*	1.80*	1.45*	1.45*	1.45*	1.45*
Jackson, Ohio		.65*	1.55*	1.30*	1.05*	1.30*	1.30*
Toledo, Ohio	1.10	1.00‡	1.10	1.10	1.10	1.10	1.10
SOUTHERN:							
Ashland, Ky.		1.05*	1.65*	1.45*	1.45*	1.45*	1.45*
Ensley & Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.25	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*		1.15*	.90*	.90*	

5c per ton discount on terms. †1½-in. to ¼-in., 1.05; ⅝-in. to 10 mesh, 1.25*; ⅝-in. to 0-in., 90c*; ¼-in. to 10 mesh, .80*. ‡Including dust.

Agricultural Limestone

(Pulverized)

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 50% thru 50 mesh	1.50
Cartersville, Ga.	2.00
Cypress, Ill.	1.25
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton	6.00
Gibsonburg, Ohio—Analysis, 55% $CaCO_3$; 43.40% $MgCO_3$; bulk, 3.00; in bags	4.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; in bags	5.00
Jamesville, N. Y.—Bulk, 3.80; in 80-lb. bags	5.05
Joliet, Ill.	3.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, in 100-lb. paper bags, 3.75; bulk	2.50
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.25
West Rutland, Vt.—Analysis, 96.5% $CaCO_3$; 1% $MgCO_3$; 90% thru 50 mesh; bags, per ton, 3.75; bulk	2.50

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 99% $CaCO_3$; 0.3% $MgCO_3$, 90% thru 100 mesh	4.00
Bedford, Ind.—Analysis, 98.44% $CaCO_3$; 0.83% $MgCO_3$; 90% thru 10 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh, per ton	1.25
Chico, Tex.—¼-in. or ⅛-in. down, per ton	1.00
Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder	3.50
Cypress, Ill.—90% thru 100 mesh, 1.10; 50% thru 100 mesh, 1.10; 90% thru 50 mesh, 1.00; 50% thru 50 mesh, .90; 90% thru 4 mesh, .90, and 50% thru 4 mesh	.90
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton	1.00
Dubuque, Ia.—Analysis, 64.20% $CaCO_3$; 32.64% $MgCO_3$; 90% thru 50 mesh	1.10
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh; bulk, per ton	1.50
Gibsonburg, Ohio—Analysis, 55% $CaCO_3$; 43.40% $MgCO_3$; 50% thru 50 mesh	1.25
Lannon, Wis. — Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼-in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
Marlbrook, Va.—Precipitated lime-marl. Analysis, 96% $CaCO_3$; 1% $MgCO_3$, 90% thru 50 mesh, bulk, 2.25; in burlap bags	3.75
Olive Hill, Ky.—90% thru 4 mesh, per ton	.50–1.00
Branchton, Penn.—100% thru 20 mesh, 60% thru 100 mesh, and 45% thru 200 mesh, per ton	a5.00
Piqua, Ohio—30%, 50% and 99% thru 100 mesh	1.00–4.00
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.15–1.70
Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 50 mesh, bulk	3.50
100-lb. paper bags, 4.75; 100-lb., cloth	5.25
Waukesha, Wis.—90% thru 100 mesh, 4.00: 50% thru 100 mesh	2.10

*Less 25c cash 15 days. (a) Less 50c comm.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh (bags extra)	3.50
Piqua, Ohio—99% thru 100 mesh, bulk, 3.25; in 80-lb. or 100-lb. bags	4.25
Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.00

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Bulk	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	10.50	.....	.....	17.50	.....	19.25
Buffalo, N. Y.	.....	.....	.....	11.00	.....	.....	.....	.....
Cedar Hollow, Devault, Mill Lane, Knickerbocker, Rambo and Swedeland, Penn.	.....	9.50a	9.50a	9.50a	8.00f	9.50d	8.50	.....
Frederick, Md.	.....	8.50	8.50	8.50	.....	8.50	6.50	13.50
Lime Ridge, Penn.	.....	.....	8.00	.....	6.50	7.50[1]	4.50	.....
West Stockbridge, Mass.	.....	8.25– 8.75	8.25– 8.75	.....	.....	13.50h	10.00	15.35
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.85	6.50	.....
Cold Springs, Ohio	.....	6.00	6.00	.....	.....	.....	6.00	.....
Gibsonburg, Ohio	7.75	.....	.....	.....	6.00	8.00	.....	.....
Huntington, Ind.	.....	6.00	.....	.....	6.00	.....	.....	.....
Marblehead, Ohio	.....	6.00	6.00	11.00	.....	.....	6.00	.....
Milltown, Ind.	.....	9.00	8.25	9.50	7.50	.....	7.00	.....
Scioto, Ohio	7.75	6.00	6.00	7.00	.....	.....	6.00	.....
Sheboygan, Wis.	.....	10.50	10.50	.....	.....	.....	9.50	20.00e
White Rock, Ohio	7.75	.....	6.00	.....	6.00	8.00	6.00	.....
Woodville, Ohio	7.75	6.00	6.00	9.00	6.00	8.00	6.00	15.00c
SOUTHERN:								
Keystone, Ala.	15.00	8.00	.....	7.50–10.00	.....	.....	6.00	13.75
Knoxville, Tenn.	.....	8.00	8.00	7.50	.....	.....	6.00	12.50
Pine Hill, Ky.	.....	9.00	8.00	7.50– 9.00	.....	.....	6.00	12.50
WESTERN:								
Little Rock, Ark.	.....	14.30	.....	14.30	.....	.....	11.90	17.40
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
Los Angeles, Calif.	15.50	14.50	.....	.....	.....	.....	16.00	.....
San Francisco, Calif.†	20.00	20.00	12.00	20.00	.....	.....	.....	.....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[5]	.....	11.00[4]	.....

[1]In 100-lb. bags. [4]To 14.50. [5]Also 13.00. *Price to dealers. †Wood-burnt lime: finishing hydrate, 20.00 per ton; pulv. lime, 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. (a) In 50-lb. paper. (c) In steel; in wood, 14.00. (d) In 80-lb. paper bags. (e) In steel. (f) For chemical purposes. (h) To 17.50.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 300-mesh, 6.00 per ton in paper bags

Slate Granules

Esmont, Va.—Blue, 7.50 per ton.

Granville, N. Y.—Red, green and black, 7.50 per ton.

Pen Argyl, Penn.—Blue-black, 6.00 per ton in bulk.

Roofing Slate

City or shipping point	Prices per square—Standard thickness 3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Bangor, Penn.—						
Gen. Bangor No. 1 clear	10.00–14.00	20.00	25.00	29.00	40.00	50.00
Gen. Bangor No. 1 ribbon	9.00–10.25	16.00	20.00	25.00	35.00	46.00
No. 1 Albion	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Gen. Bangor No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Pen Argyl, Penn.						
Graduated slate	.....	16.00	23.00	27.00	37.00	46.00
No. 1 clear (smooth text)	7.25–10.50; Albion-Bangor medium, 8.00–9.00; No. 1 ribbon, 8.00–8.50					

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc, per ton 5.00
- Ground talc (20-50 mesh), bags 6.50
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel crayons, gross 1.50– 2.00

Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¼% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh 7.00– 7.50
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of burlap bags. Terms 1%, 10 days.

Clifton, Va.:
- Ground talc (150-200 mesh), in bags 10.00

Emeryville, N. Y.:
- Ground talc (200 mesh), bags 13.75
- Ground talc (325 mesh), bags 14.75

Hailesboro, N. Y.:
- Ground talc (300-350 mesh), in 200-lb. bags 15.50–20.00

Henry, Va.:
- Crude (mine run), bulk 3.50– 4.00
- Ground talc (150-200 mesh), in bags 6.00– 9.25

Joliet, Ill.:
Ground talc (200 mesh), in bags:
- California talc 30.00
- Southern talc 20.00
- Illinois talc 10.00

Los Angeles, Calif.:
- Ground talc (150-200 mesh), in bags 15.00–25.00

Natural Bridge, N. Y.:
- Ground talc (325 mesh), bags 10.00–15.00

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Gordonsburg, Tenn. 4.25– 4.75
- Mt. Pleasant, Tenn.—B.P.L. 72-77% 5.00– 6.75

Ground Rock
(2000 lb.)

- Gordonsburg, Tenn. 5.25– 6.00
- Mt. Pleasant, Tenn.—(Lime phosphate) —B.P.L. 73%; per ton, bags extra 11.80
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.00– 5.25

Florida Phosphate

(Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines
- 68/66% B.P.L. 3.15
- 70% minimum B.P.L. 3.75
- 72% minimum B.P.L. 4.25
- 75/74% B.P.L. 5.25
- 77/76% B.P.L. 6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Rumney Depot, Bristol and Cardigan, N. H.—Per ton:
- Punch mica, per ton 150.00–240.00
- Mine scrap 22.50
- Mine run 325.00
- Clean shop, scrap 25.00
- Roofing mica 37.50
- Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh 60.00

Spruce Pine, N. C.—Mine scrap, per ton 18.00– 20.00

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

City or shipping point	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	Plaster Board ¼x32x 36". Per M Sq. Ft.	Plaster Board ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton; floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.													
Grand Rapids, Mich.	.....	.....	.....	9.00	9.00	9.00	.....	.....	.....	.....	15.00	15.00	27.00
Los Angeles, Calif. (a)	.....	7.50	7.50	12.20	12.20	.....	13.20	.....	29.00	.....	.....	.....	.....
Medicine Lodge, Kan.	1.40	.....	.....	.....	.....	.....	11.50b	.....	16.00b	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	.....	14.90b	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	——	——	.....	.....	20.00	25.00e	33.00d

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) ⅜-in. plaster lath, 16c per sq. yd. (b) Includes paper bags. (c) Includes jute sacks. (d) "Gyproc," ½-in.x48-in. by 5 and 10 ft. long. (e) ½x48-in. by 3 to 4 ft. long.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	‖12.50–‖14.50	‖12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, per ton in bags		12.00
Crown Point, N. Y.—Mica Spar		‖9.00–‖12.00
Davenport, Iowa — White limestone, in bags, ton	‖6.00	‖6.00
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt.—White		‖9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		c5.50
Phillipsburg, N. J.—Royal green granite, in bags	15.00–18.00	
Randville, Mich. — Crystalite crushed white marble, bulk	4.00	4.00– 7.00
Tuckahoe, N. Y.	7.00	
Warren, N. H. (d)		‖8.00– 8.50

‖C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Granular Glasspar

(Chemically Controlled)

Spruce Pine, N. C.—Color, white; analysis, K_2O, 7.20%; Na_2O, 3.70%; SiO_2, 70%; Fe_2O_3, 0.05%; Al_2O_3, 17.50%; per ton, in bulk 10.50

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh 18.00

Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 5.50%; Na_2O, 5.50%; SiO_2, 68.80%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk 18.00

Potash Feldspar

East Liverpool, Ohio — Color, white; analysis, K_2O, 11.00%; Na_2O, 2.25%; SiO_2, 68.00%; Fe_2O_3, .08%; Al_2O_3, 17.95%, pulverized, 99% thru 200 mesh, in bags, 22.00; in bulk 20.00

Erwin, Tenn.—White; analysis, K_2O, 10.50%; Na_2O, 2.75%; SiO_2, 67.75%; Fe_2O_3, .08%; Al_2O_3, 18.00%, pulverized, 98% thru 200 mesh, in bags, 16.00; bulk 15.00
Crude, in bags, 7.50; bulk 6.50

Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.30%; Na_2O, 2%; SiO_2, 67%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk 18.00

Trenton, N. J.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 69%; Fe_2O_3, 0.08%; Al_2O_3, 17%; pulverized, 98% thru 200 mesh; bulk, 20.00; in bags 21.20

West Paris, Me.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.20%; Na_2O, 3.20%; SiO_2, 65.70%; Fe_2O_3, 0.09%; Al_2O_3, 19.20%; per ton, in bulk 19.00

Rochester, N. Y.—Color, white; analysis, K_2O, 12.50%; Na_2O, 2.60%; SiO_2, 64.20%; Fe_2O_3, 0.06%; Al_2O_3, 19.10% pulverized 98% thru 200 mesh; in bags, 23.50; bulk 22.00

Cement Drain Tile

Grand Rapids, Mich.—Drain tile, per 1000 ft.

4-in.	40.00	15-in.	325.00
5-in.	50.00	18-in.	450.00
6-in.	75.00	20-in.	600.00
8-in.	110.00	22-in.	750.00
10-in.	165.00	24-in.	850.00
12-in.	190.00		

Chicken Grits

Cypress, Ill.—(Agstone), per 100-lb. sack ..... .90
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per 100-lb. sack, f.o.b. Chico 1.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton 6.00
El Paso, Tex.—(Limestone), per 100-lb. sack ..... .75
Gibsonburg, Ohio—(Agstone) 10.00
Joliet, Ill.—(Agstone) 10.00
Los Angeles, Calif.—(Gypsum), per ton, including sacks 7.50– 9.50
Middlebury, Vt.—Per ton (a) 10.00
Piqua, Ohio—(Pearl grit), No. 1 and No. 2 ..... 1.00– 4.00
Port Clinton, Ohio—(Gypsum), per ton 6.00
Randville, Mich.—(Marble), per ton, bulk 6.00
Warren, N. H. 8.50– 9.50
Waukesha, Wis.—(Limestone), per ton 8.00
West Stockbridge, Mass. ..... ‖7.50–‖9.00

(a) F.o.b. Middlebury, Vt. ‖C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis. (f.o.b.) Barton) 9.50
Dayton, Ohio 11.50
Detroit, Mich. ..... ‡13.00–15.50b
Flint, Mich. ..... 15.50‡
Grand Rapids, Mich. 14.00
Iona, N. J. 11.00–12.00
Jackson, Mich. 13.00
Madison, Wis. ..... 12.50†
Milwaukee, Wis. 12.50*
Minneapolis and St. Paul, Minn. 9.50*
Mishawaka, Ind. 11.00
New Brighton, Minn. 10.00
Pontiac, Mich. 13.00
Saginaw, Mich. 13.50
Sebewaing, Mich. (at yard) 12.50
Syracuse, N. Y. 18.00–20.00
Toronto, Canada ..... §12.00–‡13.00*
Wilkinson, Fla.—White, 10.00; buff .. 14.00
Winnipeg, Canada 15.00

*Delivered on job. †Less 50c dis. per M 10th of month. ‡5% disc., 10 days. §Delivered in city. (b) Truck delivery.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	
Beloit, Wis.:	
8x8x16	16.00*
Brookville, Penn.: 8x8x16	20.00–23.00*
Camden, N. J.: 8x8x16, each	.18b
Chicago, Ill.:	
8x8x16. Each	.17§
8x8x16. Each	.20a
Columbus, Ohio: 8x8x16	14.00§–16.00‡
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12‡
Lexington, Ky.:	
8x8x16	‡18.00*
8x8x16	†16.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*
Omaha, Neb.:	
8x 4x16, each .06½§; 8x6x16, each	.09§
8x 8x16, each .10§; 8x8x16, each	.12‡
8x12x16, each	.15§
Oak Park, Ill.:	
8x8x16, per 1000	160.00
Passaic, N. J.: 8x8x16 in. Each	.16
12x8x16 in. Each	.24
Pittsburgh, Penn. (Prices at yard)	
8x 8x16. Each	.17§
8x 8x16. Each	.19a
8x12x16. Each	.20§
8x12x16. Each	.22a
Wichita, Kan.:	
8x8x16. Each	.11§

*Price per 100 at plant.
†Rock or panel face.
‡Face. §Plain. (a) Rock face. (b) Less 5%.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—French tile, 9x15 in., per sq. 9.50–11.50
Spanish tile, 9x15 in., per sq. 10.00–12.00

Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Lexington, Ky.—8x15, per sq.: Red	15.00
Green	18.00
Longview, Wash.: 4x6x12-in., per 1000	55.00
4x8x12-in., per 1000	65.00
New Castle, Penn.—Red, 9x15-in.	12.00
Green, 9x15-in.	15.00

New York City, N. Y.:
Roofing tile, red, 10.00; green 12.00

Cement Building Tile

Oak Park, Ill. (Haydite):
8x 8x16, per 100 ..... 20.00
Lexington, Ky.:
5x8x12, per 1000 ..... 55.00
4x5x12, per 1000 ..... 35.00
Longview, Wash. (Stone Tile):
4x6x12, per 1000, at plant 54.00
4x8x12, per 1000, at plant 64.00
Wichita, Kan.: (Duntile)

		Plain	Glazed
8x8x12.	Each	.10½	.14
6x8x12.	Each	.09½	.13
4x5x12.	Each	.05	.08
4x4x12.	Each	.04½	.07½

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Beloit, Wis.	20.00	
Camden & Trenton, N. J.	17.00	
Oak Park, Ill., "Haydite"	16.00	
Ensley, Ala., "Slagtex"	*10.00–13.00†	
Longview, Wash.	16.50	22.00– 40.00
Milwaukee, Wis.	14.00	20.00– 42.50
Omaha, Neb.	18.00	30.00– 40.00
Prairie du Chien, Wis.	14.00	22.00– 25.00
Rapid City, S. D.	16.00–18.00	30.00– 35.00

*Price f.o.b. plant. †Delivered on job in city.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00
Joliet, Ill.—All passing 100 mesh, f.o.b. Joliet, including cost of bags	24.00

Stone-Tile Hollow Brick

Prices are net per thousand, f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.		53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.		55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans La.	35.00	45.00	60.00
Norfolk Va.	35.00	50.00	65.00
Passaic, N. J.	40.00	52.50	70.00
Patchogue, N. Y.		60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4-in.	6-in.	8-in.	10-in.	12-in.	15-in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich. (b)																	
Sewer	.....	.12	.18–.20	.27½	.35	.57½	1.00	1.11	1.48	1.66	.....	.....	.....	.....	.....	.....	.....
Culvert	.....	.....	.....	.57	.67	.93	1.20	.....	1.48	1.80	2.10	2.25	3.35	4.00	5.10	5.85	7.42
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Mercedes, Texas																	
Tongue and groove	.....	.20	.23	.29	.35	.....	.74	.91	.....	1.38	.....	2.28	.....	.....	.....	.....	.....
Sewer	.16	.22	.32	.41	.53	.78	1.05	.....	.....	1.98	.....	.....	.....	.....	.....	.....	.....

Cast stone window sills, 5 in. x 5½ in., 50c per lineal ft.

Milwaukee, Wis.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Newark, N. J. (d)	.....	.....	.....	.....	.90	1.15	1.50	.....	.....	1.85	2.35	2.76	3.77	4.93	6.21	7.66	9.28
Unreinforced	.....	.16	.25	.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk, Neb.	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (e)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Wahoo, Neb. (c)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31

†21-in. diam. (a) 24-in. lengths. (b) Sewer, 21-in., 1.29; culvert, 21-in., 1.45. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced, 21-in., 1.69; unreinforced, 21-in., 1.26; 5% cash discount. (e) Reinforced.

News of All the Industry

New Incorporations

Acme Gravel Co., San Antonio, Tex., $5000. R. W. Ingram, H. B. Ingram and J. E. Ingram.

American Gravel Co., Dallas, Tex., $10,000. Robert Davidson, Ozelle Davidson and I. T. Kent.

Eastern Slate and Stone Co., Inc., Bogota, N. J., $50,000. John W. Waldron, Leonia, N. J.

Eastern Sand and Gravel Corp., Philadelphia, Penn., 20,000 to 200,000 shares of no par value stock.

Robinson Gravel Co., Austin, Tex., $2500. Alonzo Robinson, James M. L. West and A. C. Kater.

Illinois Silica Sand Co., 820 Pearl St., Ottawa, Ill., $10,000. Everett W. and Frances B. Weaver and Paul Bechtner.

E. F. Benson, Inc., Whitman, Mass., $50,000. To produce gravel. Elmer F. and Marion S. Benson and Helen M. Davenport, all of Whitman.

Clearwater Gravel Co., Bagley, Minn., $50,000. C. H. Taylor and A. C. Taylor, both of Duluth, and George Campbell of Eveleth, Minn.

United Granite Corp., Minneapolis, Minn., 5000 shares common stock, of no par value, and 10,000 shares preferred stock, par value $100 each. Wilbur D. Shaw, Sam W. Campbell and Matthew J. Levitt.

Agricultural Potassium Phosphate Co. of California, Ltd., 7 West Tenth St., Wilmington, Del., 30,000 shares of Class A common stock and 60,000 shares Class B common stock, no par value. C. S. Peabble. A. V. Lane and H. E. Grantland, all of Wilmington.

Quarries

Erie Stone Co., Huntington, Ind., was awarded contract for supplying crushed stone to its county during the coming year.

Hartsburg, Mo. The government has opened a rock quarry on the farm of Fritz Ackman, about two miles west of Hartsburg.

Louis W. Smith and **Walter Welp** are developing a deposit of limestone three miles west of Fort Dodge, Ia. Modern machinery, including crushers, drills and hoists, is to be installed.

Basalt Rock Co. has leased the Will Smith holding on the tidelands between the Southern Pacific holdings and the waterfront at Vallejo, Calif., as location for a new plant.

Indian River Marble Co. is developing a marble deposit at Olive Hill, Tenn. Machinery is now being installed at the plant and the company expects to be shipping by the spring.

Breckenridge, Mo. The city officials have purchased a small rock crusher and propose to use the machine to crush rock into "chat" size for graveling of streets.

Iowa. Keokuk County's new rock crusher has been installed at the Schipfer Bros. farm three miles north of Sigourney, Ia., where a rich limestone bed is located. It is expected that installation of the crusher will mean a considerable saving on limestone for county use.

Wayside, Kan. The last of four rock quarries to be opened by the county to provide work for men who otherwise would be out of employment was thrown open recently on the Bowersock farm, one-quarter mile south of Wayside. The stone quarried is to be used in road repair and construction.

Cleveland Quarries Co. has been granted permission by the Berea, Ohio, council to retain a part of its building in the line of West Center St. indefinitely. The company, however, will have to remove part of the building so that a safe turn may be made at Mill and Center Sts. Operations have been resumed at the Elyria, Ohio, plant after a temporary shutdown of two and one-half weeks.

Sand and Gravel

Wallaceburg Sand and Gravel Co., Wallaceburg, Ont. The tug "Annette Fraser" of the company was recently destroyed.

Community Gravel and Sand Co. is installing a new 80-hp. gasoline engine at its plant at Bourbon, Ind.

Lutesville Sand and Gravel Co., Inc., Cape Girardeau, Mo., has purchased the property of the Colfax Gravel Co., Inc.

Pacific Coast Aggregates plant at Fair Oaks, Calif., was damaged by fire recently, with a loss estimated at $3000, according to Superintendent W. E. Hathaway.

Walter J. Steiner's gravel plant south of Pleasant Hill, Ohio, was burglarized for the fourth time in recent months. Tools and gasoline valued at $65 were taken.

Columbia Sand and Gravel Co., Washington, D. C., at its recent meeting added Henry N. Brawner, Jr., and James O'Donnell to the board of directors.

Pioneer Sand and Gravel Co., Seattle, Wash., has been awarded contract to furnish Tru-Mix for the construction of the new service station on Fifteenth Ave. in Seattle.

Iowa Falls Sand and Gravel Co., Iowa Falls, Ia., is planning to open up a gravel pit on the Moody farm just south of Iowa Falls. A half-mile spur track is to be laid from the plant to the Chicago & Northwestern railroad.

O'Brien Bros. Sand and Gravel Co., Port Jefferson, N. Y. Work on the new plant which the company is constructing at Belle Terre is progressing rapidly and the plant is expected to be in operation very soon.

Seaboard Sand and Gravel Corp.'s application for an extension of time within which to complete dredging in Mt. Sinai Harbor, New York, to December 31, 1933, has been approved by the government.

Myers Sand and Gravel Co., Anderson, Ind., elected the following officers at its annual meeting: Harry Hardie was named president of the board of directors; other members of the board include Phillip B. O'Neill, vice-president, and Linfield Myers, secretary-treasurer.

Whitney Bros. Co., Duluth, Minn., sand and gravel producers, has announced its affiliation with Merritt-Chapman and Scott Corp., New York City, and that it will be known in the future as Merritt-Chapman and Whitney Corp. The company will continue to operate over the entire Great Lakes district as a self-contained unit under the same management.

Standard Gravel Corp., newly organized firm, has purchased the controlling interest of the Young Sand and Gravel Co. of Dennisville, N. J. Officers of the company include Senator Charles C. Read, president; H. W. Hubbs of New York, vice-president; Henry Clouting, secretary and treasurer; John L. Brooks, New York, assistant treasurer. A large new plant is to be erected.

Olympia Sand Co.'s plant located ten miles from Santa Cruz, Calif., was damaged by a fire which destroyed the tool house, warehouse with supplies, and the gasoline storage house and office. The fire broke out in the tool house and the cause is believed to have been defective wiring. Quick action by the local fire department saved the plant, which is valued at over $50,000, from destruction. The loss is placed at approximately $3000. Rebuilding of the warehouse will begin at once.

Cement

Universal Atlas Cement Co.'s Birmingham mill has resumed manufacture of cement after a three months' shutdown.

Kosmos Portland Cement Co., Inc., Louisville, Ky., has placed its advertising account with the Procter and Collier Co., Cincinnati advertising agency.

Ash Grove Lime and Portland Cement Co., Kansas City, Mo., outlines the time-saving advantages of its "Quikard" cement in a striking new folder which is being circulated to the trade.

West Penn Cement Co., Butler, Penn. About 90 men have returned to work at the West Winfield plant of the company. Operation of the plant will be resumed gradually.

Wolverine Portland Cement Co.'s plant at Coldwater, Mich., is to be opened soon. Repair crews have been at work putting the plant in shape for early spring operation.

Olympic Portland Cement Co.'s plant at Bellingham, Wash., which was closed in December to make repairs, has been partially reopened. For the present one of the company's three kilns will be operated. Repairs are now being made at the Kendall district quarry of the company.

Marquette Cement Manufacturing Co., Chicago, Ill. Setting a record as the largest single cargo of cement ever shipped into Memphis, the company's tow of four barges arrived here recently with 6,000,000 lb. of cement on board. The cement is being stored in the company's new riverside plant for sacking and distribution.

Dewey Portland Cement Co.'s sales representatives from Iowa, Illinois, Wisconsin and Minnesota attended the recent annual sales meeting of the company at Davenport, Ia. Plans for the coming year were discussed and the men made an inspection trip through the company's plant near Buffalo.

Colorado Portland Cement Co.'s plant at Portland, Colo., has resumed operations after a temporary shutdown. Slack coal from southern Colorado mines will be used to operate the plant until March 1, at which time the new natural gas equipment will be put in operation. Operations at the Boettcher plant of the company are now under way after a three months' shutdown.

Yosemite Portland Cement Corp. has temporarily shut down the manufacturing departments of the company in order to cut down an accumlated oversupply of stock materials. With a 60 days' supply of clinker on hand, grinding, packing and shipping departments are still in operation. The tentative plan, according to G. A. Fisher, general manager, is to resume operation of the entire plant when the clinker is exhausted.

Lone Star Cement Co.'s mill at Dallas, Tex., has resumed operation on a curtailed basis. It is planned to operate the plant on this basis until spring, when the increased demand for cement will enable the company to increase its operating schedule. Lone Star Cement Co. Kansas plant at Bonner Springs, Kan., after a temporary suspension of activities, has resumed operation on a basis that will give work to nearly one-half of the plant's regular employes for the remainder of the winter.

Lime

Central Lime and Cement Co. reports that 1500 ft. of copper wire was stripped from its gravel pit at Afton, Wis., recently.

Crescent Lime and Marble Co., Springfield, Ill., has leased the lime kiln at Pittsfield, Ill. The kiln was built 35 years ago, but has been idle for the last 20 years. During its previous production it had an output of between 90 and 100 bbl. of lime a day. The new operators plan to increase its capacity.

Gypsum

Universal Gypsum and Lime Co. has leased office space in the Dierks Bldg., Kansas City, Mo.

Agricultural Limestone

Cedar Co. Lime Works, El Dorado, Mo., has recently placed in operation a plant for the purpose of crushing limestone for fertilizer, for ready-mix concrete and for road materials.

B. J. Springer, Powersville, Ia., has installed a limestone crusher on his farm and is furnishing farmers of the vicinity with agricultural limestone for soil fertilization purposes.

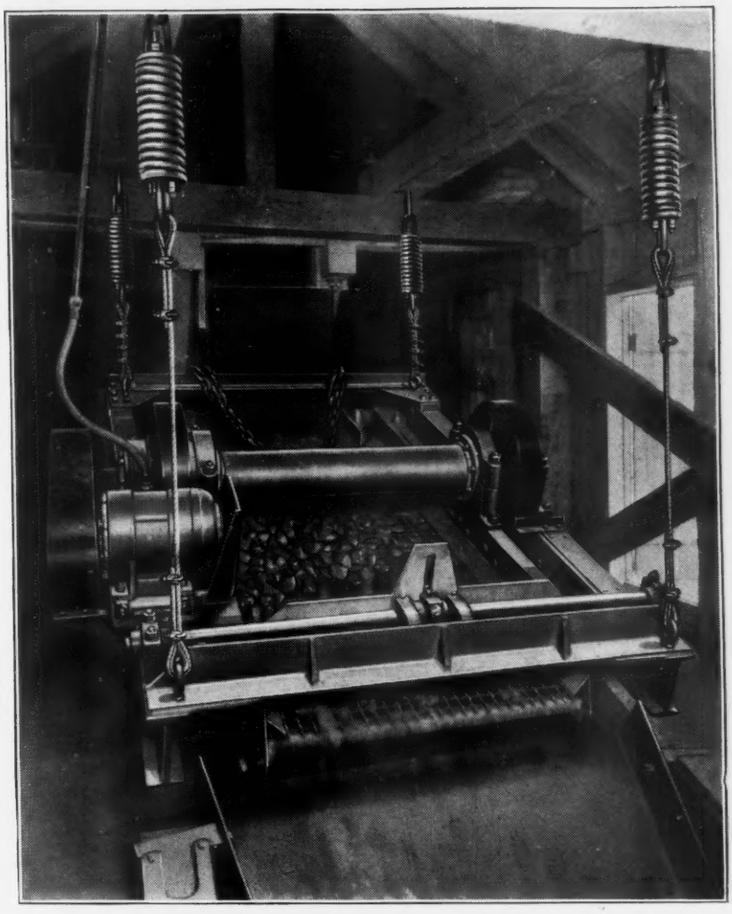
Terrace, B. C. The Kitsumkalum Farmers' Institute will investigate the deposits of limestone in this vicinity, with a view to installing a rock crusher to prepare agricultural limestone for soil fertilization purposes.

Climax Limestone Co.'s old quarry at Wick, Penn., is to be reopened by Frank Younkins and O. S. Minor of North Liberty, who are heading a new company. Messrs. Younkins and Minor acquired the property last fall after it had been idle for a year, and now have a crew of men at work repairing the old equipment and installing new machinery. The plant will be operated entirely by electricity. Limestone for agricultural purposes will be produced on a large scale.

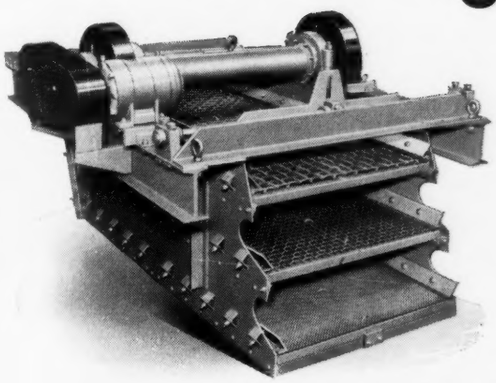
Cement Products

Thrower Marble and Tile Co., Charlotte, N. C., incorporation notice of which appeared in ROCK PRODUCTS January 17, has announced plans for expansion during 1931. The company produces terrazzo in addition to marble and tile.

Haydenite Concrete Products and Construction Co., West Frankfort, Ill., in order to aid employment, has adopted a five-day-week plan in the operation of its plant.



Positive Mechanically Produced Motion—equal over entire screen surface



Allis-Chalmers vibrating screens are built with one, two and three decks in sizes 3′ x 6′ and 4′ x 8′ to suit conditions of operation.

. . . . The result, large capacity and a clean product. Allis-Chalmers Vibrating Screens have self-aligning, anti-friction bearings with positive dust seals, alemite lubricated; large eccentric shafts; and all rotating parts fitted with safety guards. The vibrating mechanism can be removed without disturbing the screen body or supporting frame. Screen sections are easily changed and are reversible, end for end. They are also interchangeable. The screening angle is adjustable. Centrifugal Vibrating Screens are built with single, double or triple decks. The liberal clearance between decks facilitates spouting and the changing of screen surfaces. . . . Details of construction and other data on vibrating screens are given in Bulletin 1470-A. May we send you a copy?

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

When writing advertisers, please mention ROCK PRODUCTS

Miscellaneous Rock Products

California Potassium Phosphate Co. is planning the construction of a large potassium plant with a capacity of 20,000 tons at Paris, Idaho. According to C. B. Hayes, managing director of the company, the plant will be constructed on a site near the company's loading station and will be built in units. The company has opened offices in the Browning Bldg., Paris.

Keenan Structural Slate Co. and the **Brown Co.**, owned by the same interests, held an annual meeting of stockholders at the office of the two corporations, First National Bank Bldg., Easton, Penn. Officers and directors were chosen as follows: Brown Co.—L. Renton Brown, president; R. S. Brown, New York City, vice-president; W. G. Seibert, secretary and treasurer. The three officers and Robert W. Bowlby, Easton, constitute the board of directors. Keenan Structural Slate Co.—L. Renton Brown, president; Edward H. Tait, vice-president; W. G. Seibert, secretary; Walter J. Keenan, treasurer. The four officers also constitute the board of directors.

Personals

A. J. Rooney has been appointed assistant general sales manager of the Huron Portland Cement Co., Detroit, Mich.

Lawrence Whiting, chairman of the board of the Indiana Limestone Co., gave a radio talk over the Columbia network on January 17 on the Indiana limestone industry.

Frederick L. Clarkson, a member of the sales force of the Edison Portland Cement Co., outlined the manufacture of cement in a very interesting talk before the Rotary Club at Metuchen, N. J.

Adjutant-General R. E. Mittelstaedt of Sacramento, Calif., has retired from state service to accept the position of managing vice-president of the California Lime Products Co. of Sacramento.

B. F. Morris has resigned as general manager of the George Scofield Co. of Tacoma, Wash., to go with the Pioneer Sand and Gravel Co. of Seattle.

Howard Babb, southeastern Indiana representative of the Atlas Portland Cement Co., presented an interesting and instructive motion picture on cement at a recent luncheon meeting of the Rotary Club of Shelbyville, Ind.

J. C. McCoy has been appointed district sales manager for the Ash Grove Lime and Portland Cement Co., in charge of the Oklahoma City, Okla., district office, located at 1206 Petroleum Bldg. Mr. McCoy will have charge of sales in Oklahoma and Texas.

Floyd Scott, superintendent of the Montana Phosphate Co., Deer Lodge, Mont., was the principal speaker at a recent luncheon meeting of the Rotary Club of this section, and gave a very interesting talk on the phosphate industry of Powell county, Montana.

L. L. Van Nest, sales representative of the Lehigh Portland Cement Co., gave an illustrated address before Lions' Club at New Castle, Penn., recently. The address was entitled "In Your World of Construction" and depicted the growth of the building construction industry.

Andy Riley, Waterville, Ohio, is the creator of a miniature sawmill which has been on display in the window of a local hardware company. The ingenious contrivance was cut out by Mr. Riley with a pocket knife. Mr. Riley has also constructed a model of an oil field with derricks and three wells pumping oil into the tanks.

Thomas W. Pangborn, president of the Pangborn Corp., Hagerstown, Md., has recently been elected to the board of directors of the Equitable Trust Co., Baltimore, Md. Mr. Pangborn is also a director in the Maryland-Virginia Joint Stock Land Bank of Baltimore and the Hagerstown Bank and Trust Co. of Hagerstown, Md.

J. W. Kelly of the Portland Cement Association, Chicago, has been lecturing in the Northwest on problems of the cement industry. Two lectures were given in Portland, Ore., on January 21 and 22 on the respective subjects of "Quality Control of Concrete" and "Monolithic Buildings." Other lectures were given at Corvallis and Eugene, Ore., dealing with the same subjects.

Bert Koenig of the Koch Sand and Gravel Co., Evansville, Ind., has been elected president of the city park board of Evansville for the year. **H. F. Koch** of the same company has been selected as a member of the advisory council of the Chamber of Commerce for the ensuing year. Mr. Koch has also been made chairman of the bridge committee for this year.

R. R. Wason has been elected president of Manning, Maxwell and Moore, Inc., New York City, succeeding C. A. Moore, who had been president of the company since April, 1927. Mr. Moore retains his contact with the company as chairman of the board of directors. Mr. Wason was also elected president of the Consolidated Ashcroft Hancock Co., Inc., one of the large subsidiaries of Manning, Maxwell and Moore, Inc.

Obituaries

E. T. Burgess, superintendent of the Harris Granite Co., Etacy, and also the Collins Granite Co. at Pelham, N. C., died January 25 following a sudden heart attack.

James Drennan, 62, secretary-treasurer and manager of the Utah Granite and Marble Co., Salt Lake City, died suddenly following a heart attack. He became identified with the Utah Granite and Marble Co. when the company was organized in 1914, and together with John McLachlan, president, owned controlling interest of the concern.

Manufacturers

Harnischfeger Corp., Milwaukee, Wis., and its subsidiary, Milwaukee Electric Crane and Hoist Co., have been consolidated and henceforth sales of both companies will be handled by the Harnischfeger Sales Corp.

Deister Machine Co., Fort Wayne, Ind., has appointed the Henry A. Petter Supply Co., Paducah, Ky., as distributors for southeastern Missouri, southern Illinois, western Kentucky and northwestern Tennessee.

Chicago Pump Co., Chicago, Ill., announces that R. K. Rothrock, 2204 Jefferson Ave., New Orleans, La., will represent the company in the New Orleans territory. J. M. McCrea, 153 Oakland St., Syracuse, N. Y., will represent the company in the Syracuse territory.

Illinois Testing Laboratories, Inc., Chicago, Ill., has appointed James H. Knapp Co., 4920 Loma Vista Ave., Los Angeles, with a branch in San Francisco, as exclusive Pacific Coast distributor for its indicating pyrometers, resistance thermometers, and other electrical and magnetic measuring instruments.

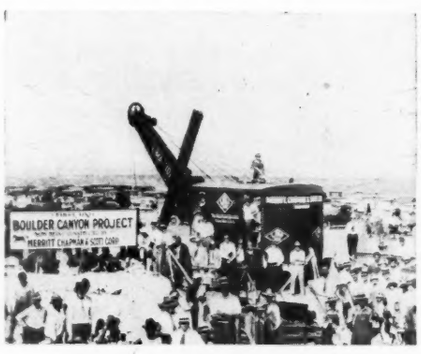
Southwark Foundry and Machine Co. has transferred the major portion of its assets to Baldwin-Southwark Corp., Philadelphia, Penn., and the latter corporation has assumed all outstanding liabilities and will carry on the entire business formerly done in the name of Southwark Foundry and Machine Co.

The Good Roads Machinery Co., Inc., Kennett Square, Penn., has concluded arrangements with Mussens, Ltd., of Montreal, Canada, to act as distributors for its line throughout the Dominion of Canada. Mussens, Ltd., with headquarters at Montreal, covers Canada from coast to coast, and, in addition to the offices at Montreal, has large distributing warehouses at Toronto, Winnipeg and Vancouver.

Linn Manufacturing Corp., Morris, N. Y., announces a reduction in price for the new Linn tractor (Model 6-28-F). The reduction is explained by G. R. Hanks, president of the corporation, as follows: "Due to the decreased cost of production, we find that we can reduce the price of our new tractor without lessening the standard of workmanship and quality that we have set and maintained for ourselves. With the millions of dollars appropriated by national, state, and local governments for the building of roads and for public construction in 1931, we look for a good tractor year."

The Linde Air Products Co., New York City, will occupy Booth C-9 at the National Western Metal and Machinery Exposition, San Francisco, Calif., on February 16 to 20. The feature of the exhibit will be the testing of welded steel coupons with the company's portable tensile testing machine, and a complete line of equipment for oxwelding and cutting and tank appliances for heating and lighting will be exhibited. C. S. Smith will be in charge of the booth.

The Ohio Power Shovel Co., Lima, Ohio, advises that its Lima "101," a 1¼-yd. Timken-equipped shovel, is being used for excavating in the construction of the Boulder Dam project, which will be known as Hoover Dam. The shovel in use at this project is pictured here.



A 1-1/4-yd. shovel in use at the Boulder Canyon project

Mid-West Locomotive Works, Hamilton, Ohio, announces that Roy M. Nelson, 122 South Michigan Ave., Chicago, will represent the company in Iowa, Wisconsin, northern Illinois, northern Indiana and a part of western Michigan.

Earl C. Bacon, Inc., New York City, has appointed J. R. Smith, Oliver Bldg., Pittsburgh, Penn., as its representative in that district and the surrounding territory.

Hercules Powder Co., Wilmington, Del., advises that its new experimental laboratories, costing more than half a million dollars, which will house the research facilities of the Hercules Powder Co. at Wilmington, are nearing completion. The main laboratory building and a number of smaller units have been finished and are awaiting installation of equipment. The new location near Wilmington represents a closer contact of the company's research department and its main office, the laboratories being moved here from Kenvil, N. J.

American Chain Co., Inc., Bridgeport, Conn., announces that group life insurance amounting to $663,000 is provided for employes of the Highland Iron and Steel Co., a subsidiary at Terra Haute, Ind., under a contract between the parent company and the Equitable Life Assurance Society. This contract is in addition to one that originated in 1921, under which 4300 employes of the company and its other subsidiaries have been covered by the Equitable with group life insurance approximating $3,605,000. Both contracts provide that in the event an employe is totally and permanently disabled before age 60 he may receive the full amount of his group life insurance, with interest, in monthly installments.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention Rock Products.

Gears. Catalog **No. 48,** a 40-page booklet on Herringbone cut gears. The booklet is very complete in that it lists in the various pitches gears in three different face widths in both cast iron and steel, and covers in its writeup a complete explanation as to how their method is used. W. A. JONES FOUNDRY AND MACHINE CO., Chicago, Ill.

Dryers. New bulletin describing the Ruggles-Coles dryer for drying sticky organic and inorganic materials, essentially a single shell with a specially designed feed head to facilitate introducing the sticky wet material into the dryer and to prevent the flame from impinging against either the shell or the material. A special arrangement of lifting flights and baffles agitates the material as it passes through the drying area. HARDINGE CO., York, Penn.

Kiln-Mill. New folder on the Raymond kiln-mill for the drying and pulverizing of materials in one operation. The kiln-mill is described as a standard Raymond roller mill or impact pulverizer, equipped to take in heated air or flue gases, which evaporate moisture in the material pulverized. **The manu**facturer states that it has important uses in hundreds of different powdered products plants. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill.

Power Equipment. Zelnicker's Bulletin **No. 415** on used oil engines and other power equipment gives a long list of various makes of Diesel engines, Diesel generating plants, marine type Diesels, steam turbines, watertube boilers, electric motors, motor generators and synchronous converters, steam engine generators, boilers and other equipment available. WALTER A. ZELNICKER SUPPLY CO., St. Louis, Mo.

Portable Conveyors and Feeders for Industrial Service. Bulletin **No. 35-1,** illustrating and describing the Fairfield portable belt conveyor for handling sand, gravel, crushed stone, etc.; Fairfield portable drag conveyor for unloading coal where tonnage does not justify an investment in more costly equipment; Fairfield portable feeder, recommended for use with the portable drag conveyor for unloading coal. THE FAIRFIELD ENGINEERING CO., Marion, Ohio.

Electric Tachometers. Catalog **No. 46,** a 16-page booklet with illustrations covering Brown indicating and recording tachometers in various models, together with the electric generators used in operating same. The booklet also gives illustrations and data covering standard applications of this equipment. THE BROWN INSTRUMENT CO., Philadelphia, Penn.

Gears. Book **No. 1274** fully describing Link-Belt's recently announced P. I. V. gear—an all-metal variable speed transmission, the P. I. V. standing for positive, infinitely variable. Two double-page spreads distinctly illustrate the features of the unit, such as the side-tooth chain operating in contact with the toothed discs, which, it is claimed, assures positive action. LINK-BELT CO., Chicago, Ill.

THE AMERICAN CITY *for* DECEMBER, 1930

Voters Approve Large State and Local Public Improvement Programs

MANY bond issues, large and small, were at stake in the November election, and an imposing aggregate was approved, which should have an important part in stimulating employment and business activity.

The largest single issue involved was that of $83,000,000 for state highways, in New Jersey, along with which were approved two other proposals, $10,000,00[0] for public institutions and $7,00[0,000]

In Baltimore, Md., $14,500,000 was approved, as follows: harbor improvements, $10,000,000; airport construction, $2,500,000; streets, bridges and grade-crossing eliminations, $2,000,000.

Other local issues [a]mounting to more than sch[ools]

Prepare to Get Your Share of $400,000,000

EVERY SAND PRODUCER wants to get his share of this great sum, which will be spent on public works construction in the near future. Bond issues totalling more than $400,000,000, covering the construction of highways, bridges, public buildings, etc., were approved in the November elections.

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